BRITISH MEDICAL JOURNAL

LONDON SATURDAY JANUARY 20 1940

INVESTIGATIONS AND OBSERVATIONS ON INOCULATION TECHNIQUE

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Recently a short account was given (*British Medical Journal*, 1939, **1**, 480) of an action for damages raised in the High Court in Dublin. It was a matter of agreement that children became infected with tuberculosis after an inoculation against diphtheria, and the plaintiffs, representing some of the children, claimed that this infection was the result of injecting a suspension of living tubercle bacilli issued in error by the manufacturers instead of toxoid-antitoxin floccules (T.A.F.). Late in the course of the action counsel for the plaintiffs tried to raise another alternative, which was disallowed by the judge as having been earlier abandoned and not made the subject of evidence. This possibility—namely, the accidental contamination of the T.A.F. with living tubercle bacilli during the course of manufacture—had, however, been fully considered in advance on behalf of the defendants and made the particular subject of experiments carried out for them—experiments which proved that no such contamination could possibly have occurred. The case is probably unique in a medico-legal sense as well as scientifically, and the points raised are so important to the medical profession and to manufacturers of biological products for inoculation that we feel justified in publishing some details of the experiments carried out by us in connexion with it.

Very large numbers of injections of biological products are given daily throughout the world. Ill effects are rare, though such might conceivably occur as the result of pathogenic organisms or their toxins being present in the material injected. These might gain access either (i) during the process of manufacture or packing or (ii) at the time of administration. These two points will now be considered *seriatim*.

DURING PROCESS OF MANUFACTURE OR PACKING

A. Accidental Contamination of T.A.F. with Living Organisms during Process of Preparation

The T.A.F. used for the immunization of the children alleged to have been infected had, like similar biological products, been prepared in bulk and filled into bottles or phials containing quantities varying from 25 c.cm. to 1 c.cm. Only 25-c.cm. bottles were used for the children, and these came from two large batches, of which 8,075 and 5,150 doses, each of 1 c.cm., had been issued. Since about twenty-five children became infected with tuberculosis it was presumed that the material present in one bottle was in some way responsible for the disaster.

Diphtheria prophylactic T.A.F., issued by the laboratory concerned, was made up so as to contain 0.5 per cent. phenol, and thus the following points required to be investigated: (1) Had the strength of the phenol preservative become materially reduced during the interval between preparation and actual inoculation? (2) Was 0.5 per cent. phenol bactericidal to such a contaminant as tubercle bacilli, and, if so, what period of exposure to this strength of phenol, after such contamination, must elapse before the product became sterile? (3) Could the outer surface of the rubber cap become contaminated before waxing and the contamination be picked up by the needle of the syringe when piercing the cap, and so be introduced into the fluid in the bottle? These points were studied as follows:

Strength of the Phenol Preservative

Several samples of T.A.F., kept for periods up to two years after the addition of 0.5 per cent. phenol, were tested for their phenol content by different workers. A close approximation to 0.5 per cent. phenol was found in all cases.

Was the Phenol Bactericidal to Tubercle Bacilli?

Two different batches of T.A.F. had been used. Numerous samples of both batches were tested by all of us and had been found to contain no organisms on microscopical examination of the centrifuge sediment or on culture on various media (both before and after washing the sediment several times with saline to get rid of the phenol). Amounts varying from 1 to 5 c.cm. were inoculated subcutaneously and intramuscularly into guinea-pigs, and the animals were kept for at least two months, but none showed any evidence of tuberculosis when killed. These tests, which confirmed those carried out during the process of manufacture, indicated that the products were sterile.

There still had to be considered the possibility of contamination of one individual bottle during filling or of the use of an unsterilized bottle or cap. Samples of T.A.F. were infected with *Staphylococcus pyogenes* (*aureus*) and *Bacterium coli*; twenty-four hours later it was found that culture of the fluid yielded no growth on solid or liquid media, thus showing that the organisms introduced had been killed.

Further experiments were made, using suspensions of living tubercle bacilli of human type derived from two of the infected children. To samples of T.A.F. were added 1 mg. of tubercle bacilli (approximately 2,000 to 3,000 million organisms) to each cubic centimetre. From these

mixtures, which were kept at room temperature, cultures were made on Loewenstein's and Petragnani's media, and guinea-pigs were inoculated subcutaneously with 1 c.cm. immediately, and at various intervals from twenty-four hours up to twenty-eight days, after the addition of the tubercle bacilli. Cultures made immediately yielded growth, and a few colonies sometimes appeared in the tubes inoculated at the end of twenty-four and forty-eight hours; thereafter the culture tubes remained sterile, though retained for nine weeks in the incubator. The guinea-pigs inoculated immediately, twenty-four hours, and two, three, and five days after the addition of tubercle bacilli to T.A.F. developed tuberculosis, but those injected from the seventh day onwards remained free from infection. Similar results were obtained after the addition of tuberculous sputum and of urine containing tubercle bacilli of human type to samples of T.A.F. In other similarly planned experiments, using *Mycobacterium smegmatis* and *Mycobacterium berolinensis* as the infecting agents, it was found that the former was killed in less than seven days, the latter in two days.

From these investigations it can be concluded that, even after massive infection of T.A.F. containing approximately 0.5 per cent. phenol, tubercle bacilli are killed in less than seven days and pyogenic organisms in twenty-four hours at room temperature. In the case under dispute the minimum period between the filling of the bottles—that is, the latest time when contamination could take place—and the injection of the material was in one batch seventy-five days and in the other 135 days. Ample time was thus allowed for the bactericidal action of the phenol present to produce absolute sterility, even if such highly resistant organisms as tubercle bacilli had been accidentally introduced at the time of filling.

Possible Contamination of Rubber Caps before Waxing

To investigate the possible contamination of india-rubber caps before waxing, the outer surfaces of the caps of a number of bottles were first treated repeatedly with sterile swabs soaked in methylated spirit. When this had completely evaporated they were smeared with either (*a*) a loopful of a mixed eighteen-hour culture of *Staphylococcus pyogenes* (*aureus*) and *Streptococcus pyogenes* or (*b*) a loopful of tuberculous sputum containing large numbers of tubercle bacilli. Thereafter the infected caps were allowed to dry at room temperature for ten to twenty minutes, when some were covered immediately with melted wax at a temperature of 126° to 130° C., and others after various intervals. In each experiment a few infected caps were left unwaxed as controls.

After varying intervals of time the waxed caps were treated with methylated spirit to remove surface contaminants. With a sterile scalpel wax was scraped from the caps, and suitable media were inoculated from the exposed india-rubber surfaces and from the wax scrapings. A loopful of sterile broth was used to facilitate the inoculations. For the detection of staphylococci and streptococci, Wright's broth, glucose broth, and blood-agar slopes were used (two tubes of each for each cap), and, for the detection of tubercle bacilli, Petragnani's medium (three tubes for each cap).

When caps which had been waxed without delay were cultured immediately after waxing the test organisms were always recovered, but in small numbers, indicating that many had been killed during the process of waxing. Culture of similarly treated caps seven to twelve days later yielded no growth. When waxing was delayed for seven days after infection of the cap no organisms were recovered, though organisms could still be recovered from the unwaxed controls after twelve days, but in greatly reduced numbers. Apparently the process of waxing in the former case had been sufficient to kill the few surviving organisms left on the surface of the rubber cap.

An experiment was also made to investigate the possibility of a contamination, placed on the india-rubber cap before waxing, being picked up by the needle of a syringe used for piercing the cap. The caps of four 25-c.cm. bottles of T.A.F. were infected with tuberculous sputum and waxed either immediately or at varying intervals thereafter. The contents of the bottles were used for the inoculation of guinea-pigs. Approximately 3 c.cm. of T.A.F. was withdrawn into a 3-c.cm. syringe nine times from each bottle, so that there were nine needle punctures of each infected cap. From each syringeful two or three guinea-pigs were inoculated subcutaneously, each with 1 c.cm. of T.A.F. Altogether four groups each of twenty-five guinea-pigs were inoculated, with the following results:

(*a*) When the cap was waxed immediately after infection and the contents of the bottles were injected immediately after waxing, two out of twenty-five guinea-pigs developed tuberculosis; one had been inoculated from the seventh syringeful, the other from the ninth.

(*b*) When the cap was waxed immediately after infection and the contents of the bottle were injected ten days thereafter, or (*c*) and (*d*) when the caps were waxed seven and twenty days respectively after infection and the contents of the bottles were injected immediately after waxing, none of the guinea-pigs developed tuberculosis.

Thus the only guinea-pigs which developed tuberculosis were two out of twenty-five inoculated from a bottle that had been waxed at once after infection, the contents of the bottle being injected immediately after the waxing.

These results confirm those of the other experiments, in which cultural tests were made of the viability of organisms on rubber caps after waxing. It is apparent that momentary dipping into wax at a temperature of 126° to 130° C. does not completely sterilize caps which have been heavily infected immediately before the waxing. The short period (a matter of seconds) of exposure to this high temperature is not sufficient to kill all cocci and tubercle bacilli, although their numbers are greatly reduced. All the organisms were found to be dead, however, within seven to twelve days.

One of the batches used in the case which gave rise to the investigation was waxed in August, 1936, and the other in September, 1936. The material was injected in November, 1936, allowing an interval of two to three months between waxing and use. It was thus evident from this interval of time, and from the results of our experiments, that there could have been no living tubercle bacilli on the rubber caps under the wax at the time the T.A.F. was inoculated into the children.

B. Accidental Substitution of Living Tubercle Bacilli for T.A.F.

On the basis of the foregoing experiments evidence could have been offered to prove that non-sporing pathogenic organisms introduced into T.A.F. containing approximately 0.5 per cent. phenol do not survive for more than one week, and that any such contamination of the rubber cap before waxing is incapable, twelve days after waxing, of introducing living bacteria into the fluid by the puncturing needle. There now remained to be investigated the suggestion that a suspension of living tubercle bacilli had in some way been accidentally substituted for a bottle of T.A.F., on which suggestion the plaintiff's case was actually based.

For this to occur the worker must prepare a suspension of living tubercle bacilli of similar opacity to T.A.F. (approximately 6,000 to 9,000 million organisms per c.cm.), put it in a bottle similar to that used for the prophylactic, and cover the bottle with a rubber cap. This procedure is unlikely to be followed by any competent bacteriologist owing to the risk of personal infection during the covering of the neck of the bottle with the cap. Evidence from the laboratory concerned showed that suspensions of living tubercle bacilli are prepared only in square-shouldered rubber-stoppered 50-c.cm. bottles, and never in round

25-c.cm. bottles with rubber caps such as are used for T.A.F. They are prepared as required for the inoculation of guinea-pigs, and immediately after use the bottle, with any suspension left over, is placed in boiling lysol, and none is ever retained for use on another occasion.

The substitution of a single bottle of a living infective suspension for one of a batch filled with a sterile preparation of an entirely different kind is not a possibility requiring special precautions for its exclusion in any well-organized laboratory. If, however, it should occur, by some incredible accident or by deliberate malice, and escape immediate detection by the ordinary careful scrutiny, it is obvious that every bottle of every filled batch would have to be examined bacteriologically, and thereby rendered unsuitable for issue, to be certain of finding the one which had been substituted. Since the suggestion was made it was necessary to consider whether the material alleged to have been substituted would have had any properties, apart from its infectivity, by which its nature would be revealed in use. It was recognized that a suspension of the kind suggested would certainly contain tuberculin in solution as well as living bacilli, and that the strength of the tuberculin which would be present in a suspension of similar appearance to that of T.A.F. could be experimentally determined. On the basis of this determination it would then be possible to estimate the proportion of children injected with such a suspension who would exhibit an immediate tuberculin reaction. Strains of tubercle bacilli grown in culture from material obtained from two of the infected children were accordingly used to make homogeneous suspensions in physiological saline. Both strains were human in type and of low virulence for the rabbit. Approximately 3 mg. per c.cm. (6,000 to 9,000 million organisms) resembled the opacity of an average batch of T.A.F. A suspension of this strength was used in three series of experiments. In addition, suspensions of one-third of this strength—namely, 1 mg. per c.cm.—were used in two series of experiments. Usually five tuberculous guinea-pigs were injected intradermally with various dilutions of the suspension and with dilutions of the international standard old tuberculin for comparison. The reactions were compared twenty-four, forty-eight, and seventy-two hours later. It was found that the tuberculin content of the suspensions of tubercle bacilli was *at least* 1/200 of the amount present in the international standard old tuberculin, even when the conditions were "weighted against" the tests—for example, by heating the suspensions to 80° C. for one hour or by using suspensions less opaque than an average batch of T.A.F.

The usual dose of T.A.F. is 1 c.cm. If 1 c.cm. of such a suspension of living tubercle bacilli were injected intramuscularly into children each would receive the equivalent of 1 c.cm. of 1 in 200 or 0.1 c.cm. of 1 in 20 international standard old tuberculin. This is 50 to 500 times stronger than the usual diagnostic dose (0.1 c.cm. of 1 in 1,000 or of 1 in 10,000). A fair proportion of children between 8 and 14 years—the ages of those involved in the present case—would show a severe general and possibly also a local reaction within a few days. None of the children injected with the T.A.F., however, revealed any symptoms until several weeks after inoculation, and then not of a type having any relation to a tuberculin reaction. In a case reported by Collis (1932) a child, inoculated subcutaneously with 0.005 c.cm. (1 c.cm. of 1 in 200) of old tuberculin, showed a very severe reaction after the injection had been made.

Apart from this complete absence of tuberculin reactions, the course of the infection which did result was not compatible with the use of living tubercle bacilli in a suspension so strong as to resemble T.A.F. in opacity. If children of these ages had been inoculated with such massive doses of living tubercle bacilli (about 6,000 to 9,000 million organisms per c.cm.), grave infections, with rapid dissemination and many deaths, would almost certainly have resulted. In the present instance there was only one fatality. In most of the other children the infection apparently remained localized to the site of inoculation in the arm and the related axillary glands.

POSSIBLE CONTAMINATION OF MATERIAL AT TIME OF ADMINISTRATION

A. From the Apparatus Used for Inoculation

The introduction of any foreign protein into the tissues probably depresses tissue resistance at the site of injection, at least temporarily, and thus increases the possibility of infection (1) from the use of imperfectly sterilized syringes and needles, or (2) through infection of the syringes or needles after sterilization.

Imperfectly Sterilized Syringes and Needles

The ideal method for sterilization of syringes and needles is either by heat alone in the autoclave or, more usually, by a combination of thermal and chemical disinfection, as by boiling in 0.5 per cent. carbolic acid. As a further precautionary measure, special syringes should be reserved solely for fluids which are bacteriologically "clean." With regard to other methods, we have proved experimentally that the drawing up of boiling oil into the barrel of a syringe fails to sterilize it if sporing organisms are present even in small numbers.

Alcohol and/or ether are used by some workers for rinsing out syringes before inoculation, yet both these fluids are well known to be poor disinfectants when allowed to act for a short time only. Further, if a syringe has been previously used for aspiration of an inflammatory exudate (either acute or chronic) and if any of the exudate, which always has a high protein content, remains in the syringe, then the application of alcohol, by coagulating the protein, merely sterilizes the surface of the coagulum, which, even if extremely small, may contain many pathogenic micro-organisms in its interior.

An experiment was performed to determine if alcohol and ether, which are often employed for sterilizing syringes for mass inoculations, could be relied upon to kill the bacteria in a pathological fluid contained in a hypodermic needle and to prevent the contamination of a bottle of T.A.F. with them. The material used was sputum containing streptococci in considerable numbers. Some of this was introduced into the lumen of a No. 16 needle. The needle was dipped in absolute alcohol and was fitted to a sterile 5-c.cm. syringe. Five c.cm. of T.A.F. was drawn into the syringe through the needle. It was observed that during the filling of the syringe bubbles of air passed from it into the bottle through the needle. One c.cm. of the T.A.F. was introduced into a tube of glucose broth. The needle was removed with sterile forceps, dipped in absolute alcohol, and reattached to the syringe. A further 1 c.cm. of T.A.F. was then introduced into another tube of glucose broth. In this way five tubes of glucose broth were each inoculated with 1 c.cm. of T.A.F., the needle being dipped in alcohol after the inoculation of each tube. Ether was then drawn through the needle into the syringe and was ejected. This was followed by similar treatment with alcohol. A further 5 c.cm. of T.A.F. was transferred from the bottle to the syringe, and 1-c.cm. amounts of this were inoculated into five tubes of glucose broth, the needle being removed and dipped into alcohol after each inoculation as before. These operations were repeated until all the T.A.F.—a total of 28 c.cm.—had been used, the needle being detached and treated with alcohol after each transfer of 1 c.cm. of T.A.F. to a tube of culture medium, and the syringe and needle being treated with ether and alcohol after each 5-c.cm. amount of T.A.F. had been disposed of. The twenty-eight tubes of glucose broth were incubated, and next day it was found that a culture of streptococci was present in every one. This experiment proves that even the small amount of sputum contained in the interior of a fine hypodermic needle is not disinfected by dipping the needle in absolute alcohol, that the bacteria present can contaminate every 1-c.cm. portion of T.A.F. in a 25-c.cm. bottle, and that this contamination is not

prevented by the customary treatment of needle and syringe with ether and alcohol.

The carrying of syringes and needles in containers of alcohol or ether is definitely unsafe, even when one syringe is used for inoculation work and another for aspiration, etc. In addition to local sepsis, deaths from tetanus and gas gangrene following inoculation have been reported from time to time, but these are few in proportion to the myriads of injections given all over the world. Wanke (1926) and Jungmichel (1938) investigated deaths due to *Clostridium welchii*, and actually demonstrated living spores in the alcohol in which the syringes used for injection had been stored. The danger of trusting to alcohol is thus apparent, especially when it is realized that this anaerobe is widespread in nature.

Infection of Syringes and Needles after Sterilization

Sterilized syringes and needles may become contaminated (*a*) through coming in contact with imperfectly sterilized hands, dressings, towels, or the clothes of the operator; (*b*) by "droplet infection" from the nose or throat; (*c*) through piercing an imperfectly cleansed rubber cap covering the bottle of the product being used.

(*a*) It is of course possible to assemble a sterilized syringe with non-sterile hands without contaminating the interior of the syringe if sterile forceps are used, care being exercised that the plunger never comes in contact with the hands. If the plunger should be touched accidentally contamination may result, sometimes with pathogenic strains of staphylococci or other organisms, which are present on the skin of some normal subjects. When a series of subjects are being inoculated at the same time there is the possibility, if the same syringe and needle are used throughout, of picking up infection from the skin of those injected, or from the deeper tissues if any unsuspected pathological lesion exists, and passing such infection on to those who follow in the series. The ideal procedure is to have a battery of syringes and needles, using one syringe and needle for each subject and then resterilizing it in the water bath before it is used again in due rotation. Often, however, only one syringe is available; but a number of sterilized needles should always be at hand, one being used for each subject, and changed for a sterile one with sterilized forceps before proceeding to the next subject in the series.

In arranging for mass immunization it is the custom of one of us to autoclave six or more 3-c.cm. syringes in test-tubes of appropriate sizes, which are fitted with parchment covers. A large number of needles are sterilized separately. The syringes are retained in the test-tubes after sterilization, in readiness for use. Three subjects are injected from one syringe, and after the first and second inoculations the soiled needles are placed in a sterilizer containing boiling water, sterile needles being substituted with sterilized forceps. If there is a short interval between successive patients the syringe with the fresh needle attached is replaced in the tube, to minimize the risks of contamination of the needle from "droplet infection." When the contents of the syringe have been exhausted it is resterilized, a fresh sterile syringe being used to withdraw fluid from the bottle for the next series of subjects.

When syringes and needles have to be transported to a distance from the place where they are sterilized it is a common practice to wrap them in a sterile towel. So long as the towel is in fact sterile no objection can be taken to this method of protection; but if the towel has been contaminated with pathogenic bacteria and subsequently treated by some inadequate process there is a possibility of the syringes and needles becoming contaminated by it, and this possibility, even though it may be remote, cannot be ignored. Autoclaves are used in the majority of hospitals for the sterilization of towels and dressings, but our inquiries have shown that, all too commonly, hospital autoclaves are so used, or rather abused, that the dressings after treatment are not necessarily sterile.

Sterilization is a process usually entrusted by surgeons to the nursing staff or others, who are often ignorant of the physical laws on which sterilization depends. In an autoclave the temperature of the interior is indicated by the pressure shown in the pressure gauge, only when all air has been evacuated from the apparatus. If, for example, the autoclave contains only materials to be treated and steam, a pressure of 10 lb. per square inch indicates a temperature of 115° C.; but if a mixture of steam and air be present the interior temperature is much lower than 115° C. In treatment in an autoclave the most important thing is not the temperature of the steam but the temperature reached in the middle of a bundle of dressings and the duration of their exposure to this temperature. A thermometer fitted to the autoclave does not give us this essential information.

An experiment was carried out with a gas-heated laboratory autoclave, to imitate as closely as possible the method of autoclaving which we know to have been actually used in a hospital. No drum was employed, but the autoclave was lined with a calico sheet. The dressings consisted of two sheets, two towels, four pieces of gamgee (9 by 9 in.), three pads of wool (10 by 6 in.), a piece of gauze, and a handful of cotton swabs. These were packed in a calico bag enclosed in a similar bag. Included with these dressings were sealed tubes containing pure chemicals of known melting-point and a swab impregnated with blood and staphylococci and subsequently dried. The lid of the autoclave was closed, heat was applied, and the escape valve was shut. A pressure of 10 lb. per square inch was registered in twenty-three minutes, and by regulation of the gas tap the pressure was kept constant for thirty minutes. When the tubes were examined it was found that naphthalene (m.p. 80° C.) had been softened but not actually melted, and that saligenin (m.p. 86° C.) had been unaffected. From this it was concluded that the dressings had been exposed to a temperature of very little over 80° C. for only a short time. A culture made from the swab gave a growth of staphylococci, proving that the bacteria on the swab had not been killed.

We know from our own experience that the methods of sterilization employed in several hospitals are unsatisfactory and that dressings are occasionally supplied for operations in an unsterile condition. The dangers are obvious, and we believe that many cases of post-operative sepsis are to be attributed to faulty sterilization of dressings. To control the process satisfactorily information concerning the temperature attained in the interior of the drums and the duration of exposure is required. Recording thermometers cannot be obtained of a convenient size, and neither these, if available, nor the various indicators which by change of colour show the temperature attained, give any information concerning time. In our opinion hospital autoclaves should be under the regular supervision of the hospital bacteriologist. The safest way to prove that sterilization is effective is by showing that the process has killed bacterial spores. For some time one of us has controlled every batch of dressings autoclaved in the hospital with which he is connected, as follows. A drum, packed with dressings, contains in the middle of the dressings a tube with a dried mixture of fine manured garden soil and hay dust: both anaerobic and aerobic spore-bearing bacilli are therefore present. After autoclaving, broth is added to this tube, which is incubated overnight; and only when the broth is found to be clear and free from evidence of bacterial growth are the contents of the other drums released for use. If there is any doubt about the clearness of the broth it is plated, and the plates are incubated anaerobically. This is a fairly simple and quite reliable test, and one which we believe should be adopted in every hospital.

Droplet Infection of Needles or Syringe

(*b*) "Droplet infection" of the needles or the syringe may occur at any time between sterilization and inoculation. The doctor himself, or anyone in the immediate vicinity of his equipment, may be the source of the contamination, as in the case reported by Allison (1938), where twelve out of seventy nurses injected developed abscesses, due in all cases to the same type of haemolytic streptococcus. This organism was isolated from the throat of the nurse who had charge of the bowl of boiled water containing the needles and the syringe, the inference being that she infected the bowl and its

contents by droplet infection. Other instances are on record where infection has developed after the injection of biological products which were in themselves proved to be sterile (Madsen and Henningsen, 1939).

While pyogenic organisms are the usual contaminants there is no reason why the tubercle bacillus should not sometimes be the responsible agent. It is by droplet infection that pulmonary tuberculosis is most commonly contracted, and in the majority of instances the infection comes from an unrecognized case. A minute quantity of tuberculous sputum, either on the needle or on the plunger, is capable of infecting the entire contents of a 25-c.cm. bottle of T.A.F. This was conclusively shown by us in several experiments, the details of a typical one being as follows:

A 5-c.cm. Record syringe with a No. 18 needle and a 25-c.cm. bottle of T.A.F. were used. By means of a small platinum loop a minute droplet of sputum in which tubercle bacilli were numerous was placed on the outer surface of the needle 3 mm. from the point. The small droplet was not visible to an observer two feet away. After disinfection of the rubber cap the bottle was inverted, and the needle attached to the syringe was inserted through the cap and the syringe filled. Six samples were withdrawn from the bottle with the same needle and syringe, and with each of the six samples from one to five guinea-pigs were injected subcutaneously, each with 1 c.cm. In all, twenty-five animals were inoculated, and of these five died of intercurrent disease within five weeks of injection. Each one of the remaining twenty that lived longer showed extensive tuberculous lesions when submitted to post-mortem examination.

These results show that every cubic centimetre of fluid in the bottle contained enough tubercle bacilli to cause progressive tuberculosis in the guinea-pig; but it is also important to note that smear and cultural examinations of the last 1 c.cm. of T.A.F. taken from the bottle were negative for tubercle bacilli, indicating the scantiness of the contamination. Infection of the entire contents of a bottle was also obtained when suspensions of streptococci, staphylococci, or *Bact. coli* were used for infection of the needle instead of tuberculous sputum. In some of these experiments two or more syringes and needles were used for each bottle, only the needle attached to the first syringe being infected and thoroughly sterile syringes and needles being used for subsequent withdrawals. It was shown that a single dirty needle could contaminate the entire contents of a bottle.

It might be surmised, and in fact has been definitely stated, that any small contamination on the outside of a needle would tend to be wiped off by plunging the needle through an india-rubber cap, so that no contamination of the contents of the bottle, or only a very slight one, would result. The above series of experiments, however, indicates the contrary.

When a droplet of infected material was placed on the plunger instead of on the needle as above, the entire contents of the bottle became contaminated, even when air was not injected into the bottle on the occasion of the first sample being taken, as is usually done in practice. What happens when air is not injected before suction is applied is that as the fluid is withdrawn much frothing takes place in the syringe, due to air leaking past the plunger to overcome the vacuum created in the bottle by the withdrawal of fluid. Small bubbles of air, surrounded by a film of fluid in which the infection is present, pass into the bottle from the syringe and thus contaminate the entire contents of the bottle.

The Imperfectly Cleansed Rubber Cap

(c) As we have already pointed out, bacteria used to contaminate a rubber cap before waxing die within seven to twelve days, possibly as a result of the bactericidal action of volatile products—for example, sulphur compounds—coming from the rubber. There remains, however, the risk of the cap of the bottle being contaminated at the time of inoculation, or through a bottle being left exposed on a shelf or carried about in the doctor's bag. Such contamination might be due either to contact with infected articles or to droplet infection, the latter producing a less extensive contamination of the cap than the former. Opinions vary widely as to the best method of sterilization of the cap. One method is to wrap a sterile swab lightly wrung out of 15 per cent. lysol around the cap while the syringes and needles are being boiled—that is, for ten to fifteen minutes—at the end of which time the swab is removed and the cap is dried with another sterile swab. Scrapings made from a cap, previously smeared with a dense suspension of *Staphylococcus pyogenes* (*aureus*) and so treated, produced no growth when inoculated in Wright's broth. Other antiseptics, such as 5 per cent. carbolic, dettol, methylated spirit followed by iodine, etc., could also be used in a similar manner. There is no doubt, however, in our minds that this part of the inoculation technique either is most often neglected or is performed in a perfunctory manner; and yet, as we have shown, surface contamination on the cap can be carried into the fluid in the bottle. In the rush of everyday practice the doctor's bag at the end of the day not infrequently holds a miscellaneous collection—for example, bottles containing samples of faeces or sputum for examination, instruments, dressings, biological products, etc. The possible seepage of highly infective fluid from the pathological specimens, resulting in contamination of the rubber caps of the biological products or the other contents of the bag, cannot be ignored, and the conditions so produced would correspond with those of our experimental investigations.

B. Infection from the Subject Inoculated

Organisms are often present on and in the intact skin of the human body. Normally most, if not all, of these are non-pathogenic, but the occasional presence of such bacteria as *Staphylococcus pyogenes*, capable of producing disease, makes the sterilization at the site of every inoculation necessary. The usual but not the only method is swabbing with spirit, followed by iodine. By this means the surface of the skin only is sterilized, any organisms present in the depths—for example, in ducts of skin glands and hair follicles—not being killed. Either through failure to observe this simple technique or through the chance striking of duct or hair follicle containing organisms contamination of the needle may result. If the organisms are pathogenic and if the needle is not changed between the inoculations the infection may be conveyed from patient to patient, or to the fluid in the bottle if the cap is pierced again.

In the deeper tissues—for example, fascial planes or periosteum—a subacute or chronic lesion of such a small size as to be clinically unrecognizable may be present at the site of injection. Although the risk of a needle striking such a lesion is a small one it cannot be completely ignored. The results to be expected must be considered as they affect the individual and as they affect others. The distension of the tissues by the introduction of 1 c.cm. of fluid would cause a dissemination of infection and transform a minute and unrecognizable lesion into one clinically obvious, for which the material inoculated would probably be blamed. Owing to the resistance of the tissues to the fluid injected, infective material would probably be forced by back pressure into the needle and possibly even into the syringe. If the same syringe and needle were used for the inoculation of further persons, either without treatment or with such inadequate treatment as with ether and alcohol, infection would be introduced direct into the tissues of these. If the same syringe and needle, or even the same syringe with a new needle, were used to withdraw further amounts of fluid from the bottle, infection would probably be introduced into the bottle. Material from this bottle inoculated into other persons would introduce infection even if sterile syringes and needles were used subsequently. These considerations show that if an infective focus is struck with a needle many cases of illness of the same type may be produced, so long as the same syringe and needle are used for several injections without adequate disinfection. If the first case had an unrecognized tuber-

culous lesion, then that patient, and also those subsequently inoculated, might all develop localized tuberculous foci at the sites of inoculation. If a single bottle containing multiple doses of an injectable preparation had been used for the injection of an entire series it would naturally be regarded as the source of the trouble.

Summary

The investigations recorded show *inter alia* that (*a*) 0.5 per cent. phenol, used as the preservative in biological products, kills all non-sporing bacteria (including tubercle bacilli) within seven days; (*b*) contamination on the external surface of the rubber cap of a bottle of a biological product can be introduced into the contained fluid when the cap is pierced by a needle; (*c*) any contamination of the needle or in the syringe may infect the entire contents of such a bottle; (*d*) such contamination may occur through inadequate sterilization, droplet infection, or contact with infected material after sterilization.

The dangers of "droplet" infection in inoculation work and the efficacy of alcohol and ether as antiseptics in such work are discussed.

A simple test is described to ensure satisfactory sterilization in autoclaves.

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NASAL SINUSITIS IN CHILDREN*

BY

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Oto-laryngology in children presents many problems still unsolved. No longer is the ear and throat department of a children's hospital a mere clearing-house for tonsils and adenoids and discharging ears. The oto-laryngology of childhood has become almost a separate specialty, demanding of its practitioners a knowledge of paediatrics as well as of diseases of the ear, nose, and throat. Foremost among the problems confronting the student of this new subject is that of nasal sinusitis. Suppurations in the nasal sinuses of the adult have been so extensively studied and treated that the "nasal" patient often comes with his own ready-made diagnosis of "sinus" which he now fears, just as the ear patient has long feared "mastoid." Nevertheless, sinusitis in children has attracted attention only within the past ten years or so, and even to-day receives little or no mention in standard textbooks. The frequent failure of the tonsil and adenoid operation has driven us to investigate the nasal sinuses, and in doing so we have found that adenoids are not the only cause of persistent nasal discharge. Sometimes, indeed, the removal of adenoids may actually aggravate the complaint. What, then, is the present state of our knowledge of the problem, and what aspects of it may we profitably discuss to-day?

Anatomy and Development of the Nasal Sinuses

The maxillary sinuses and the ethmoidal cells are present at birth, having made their first appearance during the fourth month of intra-uterine life. The frontal and sphenoidal sinuses also appear about the fourth month. At birth the frontal sinus is virtually an anterior ethmoidal cell, and it does not reach the frontal region until the age of 5 years, from which time it continues to develop until the fourteenth or fifteenth year. The sphenoidal sinus at birth is a tiny pocket on the anterior surface of the body of the sphenoid. By the fourth year it is a definite cavity, with an ostium, but is still very small, and full development is not attained until after the age of puberty. On anatomical grounds, therefore, one might expect infections of the frontal and sphenoidal sinuses to be rare in childhood, and clinical observation proves that this is so. In speaking of sinusitis in childhood we assume that it is located in the maxillary or ethmoidal sinuses, or in both. The maxillary sinus, or antrum, as it is often called, is at birth a small bean-shaped cavity in the cancellous mass which forms the ascending process of the maxilla, but there are wide individual variations of size and shape.

A passing reference must be made to acute osteomyelitis of the maxilla, a serious though fortunately rare disease of infants, arising from infection of one of the dental follicles and involving the surrounding cancellous bone. It may cause extensive necrosis or orbital abscess, but it does not arise in the antrum, as was formerly believed.

Frequency of Sinusitis in Childhood

Sinusitis is now generally regarded as a common disease of childhood. Many observers have investigated the maxillary sinus as a matter of clinical routine, and they have found pus in the cavity in a surprising number of patients. Dean (U.S.A.) demonstrates sinusitis in 15 per cent. of patients; Thorkilsen (Denmark) in 8 per cent.; Mollison (London) in 22 per cent.; and Cantor (Australia) in 67 per cent.—to mention at random only a few of the published records. The extreme frequency of sinusitis in Australia will be discussed later. As regards post-mortem evidence of the incidence of sinusitis, a most illuminating report is that of J. H. Ebbs (1938). He examined the sinuses in 496 necropsies of children under 12 years of age and ascertained that 63 per cent. of the series had pus in the ears or sinuses. In 30 per cent. one or more of the sinuses contained pus. The sinus most often affected was the maxillary (29 per cent.); the ethmoidal cells were involved in 13 per cent. In all cases there was evidence of former sepsis and not merely a post-mortem change.

Clinical Manifestations

Recurrent Nasal Colds.—The most frequent complaint is that the child is "constantly catching cold" or is "never without a cold." It must be remembered, however, that many children find it difficult to learn how to use a handkerchief. They prefer to sniff back the mucopus as it accumulates, and the discharge is more frequently post-nasal than nasal; indeed, anterior rhinoscopy may reveal nothing abnormal. If every child could be trained at an early age in the art of nose-blowing (using the handkerchief, needless to say, as a receptacle and not as a clamp) there would be fewer cases of sinusitis.

Cough is another common symptom, and many cases suffer from recurrent attacks of bronchitis. When it is realized how readily pus from the nose finds its way into the lower air passages one wonders why bronchitis (and bronchiectasis) is not a constant sequel. It has been clearly proved that when this relationship does exist the sinusitis is the primary lesion. Nevertheless, this source of bronchial infection is sometimes ignored or overlooked by the paediatrician.

* Read in opening a discussion in the Section of Oto-rhino-laryngology at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

Nasal obstruction and mouth-breathing are often observed in children with infected sinuses. In many such cases adenoids are present, and still more frequently the adenoids have been removed but the symptoms have persisted. Naturally, the removal of a large obstructing mass of adenoids will favour drainage of the sinuses, but it will not cure the child when the original source of all his trouble has been a sinusitis. The nasal obstruction may be due to engorgement of the turbinal, especially if nasal allergy is present.

General Aspect.—As regards the general condition of the child who suffers from sinusitis, he is often listless and apathetic, easily tired, and devoid of the spirited energy of the normal child; he may suffer from headaches and sleeplessness; he may have that pale and puffy appearance suggestive of nephritis, and very often the mother states that "the bridge of his nose is swollen."

Sinusitis and the Tonsil–Adenoid Disease

It is unfortunate that a clearer distinction is not drawn between (*a*) enlargement, and (*b*) infection, of the lymphatic tissues of the pharynx and nasopharynx, for the two are by no means synonymous. In spite of voluminous expressions of opinion, we have no fixed criterion either of the extent of physiological enlargement or of what constitutes a "septic tonsil." We are certain, however, of two facts which have an intimate bearing upon the subject under discussion. First, we cannot hope to cure nasal discharge by removal of tonsils; and, secondly, when adenoids coexist with sinusitis they are a secondary infection, and operation, if indicated, is only part of the treatment. It is true that adenoiditis may give rise to persistent nasal discharge, curable by removal of adenoids. But if sinusitis is suspected it demands investigation, and if infection is discovered the treatment must consist in a direct though not necessarily surgical attack upon the sinus itself.

Allergy in Relation to Sinusitis

It has become a rule in treating sinusitis in adults to ascertain whether there is any coexistent allergy, and this rule applies even more strongly in children. The child who suffers from nasal discharge and who begins his day by sneezing some twenty times or more is obviously a subject of some form of allergy. Apart from such definite signs, and the pale oedematous turbinals which suggest an allergic irritant, allergic sinusitis of minor degrees is commonly noted. Allergy in children constitutes a problem by itself. Suffice it to say, for the purposes of this discussion, that in children under 5 years the food factor is usually responsible, and in older children one of the many varieties of inhaled allergen.

Ethmoiditis and its Complications

As already stated, the maxillary sinus is far more often involved than any other. Maxillary sinusitis may coexist with ethmoidal infection, or the stress of the infection may fall upon the ethmoidal cells. The first sign of ethmoiditis may be swelling and oedema of the tissues of the orbit, with proptosis, and the appearance may strongly resemble that of cavernous sinus thrombosis, especially when accompanied by prostration and high fever. As I am dealing with the far more common maxillary sinusitis, only one fact regarding the treatment of ethmoiditis may be mentioned. Radical operation is not always required, and indeed it may be a dangerous procedure, as the channels of possible infection between the nasal and cranial cavities are numerous and patent in early life. In two cases of acute ethmoiditis with orbital infection which recently came under my notice careful intranasal curettage resulted in a profuse flow of pus and brought relief. The less acute cases of ethmoiditis respond well to repeated suction and instillation of weak ephedrine.

Value of Radiography

In assessing the usefulness of *x*-ray examination of the nasal sinuses in children two points must be remembered. A common cold or an allergic attack will cause opacity of the sinuses which may persist for some time. On the other hand, if the *x*-ray appearance is normal the sinus may be regarded as healthy, and consequently we have in radiography a reliable means of controlling the results of treatment. A radiograph is essential in every suspected case, and a single chin–nose view is enough as a rule. Much valuable work has been done on the radiography of the nasal sinuses in childhood. It may be mentioned in passing that transillumination, of little value in the adult, is useless in the child.

Treatment of Sinusitis in Childhood

Three cardinal rules should be observed in treating sinusitis: (*a*) treat the patient, and not merely the sinus; (*b*) deal with the allergic state, if present; (*c*) adopt conservative means—radical operations are seldom required.

Climate.—In every case the environment and mode of life deserve investigation. Certain climatic conditions favour the incidence of sinusitis. It is very common in Australia, especially on the south coast, where there are dust-laden winds and high day temperatures in summer, with a sudden drop of 20 or 30 degrees towards evening. The effect of climate upon many common diseases is a promising subject for research by some roving medical man. Many cases of sinusitis could be cured by change of climate, though such treatment is within the reach of few patients.

Hydrotherapy is another useful form of general treatment. The value of hot baths is recognized in Japan and in Finland, and one of our own laryngologists, Dr. James Adam of Glasgow, has drawn attention to the benefit derived from hot baths containing magnesium sulphate. In my experience this has been a useful adjunct in the treatment of sinusitis in children.

Nutrition is attracting widespread attention, and the importance of a well-balanced diet is fully appreciated. In the prevention and cure of sinusitis correct feeding plays a leading part. Vitamin deficiency favours nasal catarrh and all its unpleasant sequels. "Less starch and meat, more dairy produce and fruit," is the slogan oft repeated but as frequently neglected. It is hardly necessary to add that fresh air and sunshine are enemies of sinusitis.

Biochemistry of Sinusitis

Closely related to the problem of vitamins is that of chemotherapy. This is the treatment of the future, perhaps destined to supplant surgery, but as yet we know little about it. We know, for example, that a common cold may be alleviated by large doses of bicarbonate of soda, but so far as I am aware the *p*H of the blood and of the urine has not been estimated in any large series of cases. We also know that in certain catarrhal states there is deficiency of calcium and that sodium salts cause increased elimination of calcium, yet we are slow to make practical use of our knowledge. It has been found that a small dose of insulin will often abort a common cold; but how does it act? Sinusitis is a disease which may be cured by chemistry rather than by surgery, and this

aspect of the problem offers a fruitful field for research to the enterprising laryngologist who is prepared to take a wide view of his specialty. I have no personal experience of the use of potassium iodide as a "nasal aperient." This has been advised by Leathart (1938), who gives 1 to 3 grains daily for three months; he claims that sinusitis often responds favourably to the treatment without operation.

Local Conservative Treatment

The removal of nasal discharge is a most logical means of treating sinusitis, and it is best accomplished by suction. The Proetz method of suction displacement is less applicable in children than in adults. In children a small soft rubber catheter introduced into the nose and connected with a suction pump is the most satisfactory means of cleansing, and it may be used daily or twice daily with good results. Decongestion of the engorged mucosa by argyrol tampons is also very effective. A small roll of absorbent material, such as dentists use, is soaked in a warm solution of 10 per cent. argyrol in glycerin and introduced into the middle meatal region. A coloured thread is attached to the tampon so that it may be easily withdrawn a few hours later. The treatment is repeated daily or every second day. Having employed this method for over ten years I can vouch for its effectiveness in maxillary and ethmoidal sinusitis.

As for the very popular and widely advertised "nasal drops," their number is legion. Most of them contain menthol and ephedrine in a basis of liquid paraffin. Doubtless they have their value, but they possess certain disadvantages. It has been shown by numerous workers that all interfere with ciliary action and that oily substances introduced into the nose may readily enter the lungs and produce what is known as lipoid pneumonia. The only solution which is said to be free from such disadvantages is a weak dilution of ephedrine. During the past fifteen years I have prescribed as nasal drops a 5 per cent. solution of gomenol in olive oil, with good effect and with no harmful consequence. The amount used for each instillation has not exceeded five drops into each nostril.

Of vaccine therapy I have no personal experience. Short-wave diathermy, when available, is a most valuable adjunct to other treatment. *X*-ray treatment also has its supporters, Rathbone reporting 57 per cent. cured and 28 per cent. improved.

Lavage of Maxillary Sinus

The puncture and washing out of the cavity is the generally accepted method of diagnosis and treatment. As the technique has been carefully described by Mr. Crooks (1938) one need only lay stress on a few points.

1. The patient should be lying down, with the head fully extended.

2. Local anaesthesia is not always satisfactory in children, and advantage may be taken of the general anaesthesia required for removal of adenoids.

3. A straight trocar and cannula is used, and after withdrawal of the trocar needle, a smaller cannula, connected to a syringe, is introduced through the larger cannula so as to secure a specimen of the antral contents.

4. Sometimes, especially in pneumococcal cases, the pus is too thick to pass the needle and must be ejected through the ostium and nose by forcible syringing.

5. The lavage, using normal saline, should be repeated at weekly intervals for two or three weeks. A single lavage may suffice, and the prospect of cure may usually be deduced from the result of the first washing.

Antrostomy and Radical Operation

It is generally acknowledged that operation is indicated in only a small percentage of cases of sinusitis in childhood. In such cases some authorities advise intranasal antrostomy, making a window in the middle or inferior meatus. For sinusitis in the adult, antrostomy often yields good results, but it is not to be advised in the child. Operation on the maxillary sinus of a child is a rare event, but when it is required it should be radical. Direct inspection of the sinus cavity and satisfactory drainage are the advantages of the Caldwell-Luc operation. The chief disadvantage in the child is the possibility of damage to the unerupted teeth and subsequent dental defect.

The question is fully discussed in a paper by my friend Dr. McArthur (1937) of Melbourne, who denies that the radical operation in children involves much risk to the teeth. It may be observed, parenthetically, that not only is sinusitis very common in Australia, but gross polypoid changes in the mucosa are found in most cases. McArthur has never hesitated to do a radical operation when circumstances warranted it, and he reports a series of forty cases, some of which had been unrelieved by endonasal antrostomy. Twenty of the patients were traced at a later date, and in only one had the canine teeth failed to erupt. Fifteen had the full complement of teeth, and in four cases there had been caries and some extractions. As regards nasal and bronchial symptoms, thirteen of the twenty cases were completely cured. McArthur advises that the opening in the canine fossa should be small and at a high level, with due avoidance of the infra-orbital nerve. Even if there did exist a slight risk of losing one or more teeth, it is a small price to pay for the cure of a crippling sinusitis. Nevertheless I repeat that, in this country at least, operation is seldom indicated. The majority of cases respond well to the conservative measures which I have mentioned.

Conclusion

May I here suggest the following debatable points for discussion:

1. Should routine lavage of the maxillary sinus be practised at tonsil–adenoid operations?

2. Is the sinus a focus of infection in arthritis, anaemia, nephritis, etc., in children?

3. What are the best lines of general treatment—dietetic, climatic, medicinal, etc.?

4. Of what relative value are the various local applications?

5. To what extent does radiography assist in diagnosis?

6. When is operation to be advised, and is radical operation justifiable?

Summary

An account is given of the anatomy and development of the nasal sinuses.

The frequency of sinusitis in children and its clinical manifestations are discussed.

The cardinal rules to be observed in treatment are laid down, and various methods described.

Certain debatable points are suggested as subjects of discussion.

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CHILDBIRTH AFTER PRESACRAL NEURECTOMY

BY

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It is not easy to ascertain the effect on labour of Leriche's operation of resection of the presacral plexus, as the few recorded observations on the subject often contain only bald statements given by the way and without details.

At a discussion at the Royal Society of Medicine Donaldson (1936) reported that three patients out of a series of forty-seven had a child after the operation, but that labour was not altered. Learmonth (1937) in reviewing the surgery of the sympathetic system does not mention labour after presacral neurectomy. Davis (1934) alluded to one case of a primipara of 42 years with precipitate labour after the operation, and in another place (Davis, 1933) mentions a patient in whom labour was both precipitate and painless.

Cotte (1937) reports that many of his patients "married and are now very happy mothers." One of his patients had a normal pregnancy and an interstitial pregnancy subsequently. More than fifty of his patients out of over 300 "have had consecutive pregnancies and no accident was ever noted during parturition." Keene (1935) quotes Cotte as reporting the cases of "two patients who were subjected to this operation during the early months of pregnancy on account of severe uterine pain. In both the pain was relieved, pregnancy was uninterrupted, and they were delivered naturally at term."

Collins (1938) says that some authors claim that the first stage is relatively painless, but in the second stage no difference is noted in the intensity or frequency of the pain as compared with patients who have not had sympathectomy. Reeb (1937) reports in detail one of his own cases, that of a woman of 36 years who had had vaginismus and who became pregnant four months after presacral neurectomy and appendicectomy. Nidation, gestation, and all the stages of labour, lasting six hours, were quite normal. The severity of the pains was apparently unaffected. Another of his cases was that of a woman of 42 who had been married at 27. At 37 presacral neurectomy was performed for dysmenorrhoea. At 40 a large pyonephrosis was removed and thereafter the dysmenorrhoea ceased. She became pregnant. There was a large interstitial fibroid, and three weeks before term the remaining kidney began to fail. She was delivered by Caesarean section. In recording this case he pointed out that, after sympathectomy, nidation and gestation may be quite normal in a fibromyomatous uterus.

Wetherell (1935) describes an interesting case of pregnancy and labour after sympathetic neurectomy in which he is able to correct a previous report. A very obese woman with severe primary dysmenorrhoea also had sclerotic ovaries. The left was removed and the right partially resected. He notes three points: first, the period of sterility during her four years of married life; second, the hypoplastic under-developed uterus; third, the labour pains during the first stage, which were observed by her physician. During the first stage, which lasted eighteen hours, she had no pains in front, but the irregular weak pains were felt in the back. The second stage lasted between four and five hours and was terminated by a mid-forceps operation. There was unusual relaxation of the perineum. Wetherell reports other authors as believing that a low forceps delivery is required more often than usual. He concludes that "there is no deleterious effect on libido or future pregnancy because of resection of the superior hypogastric plexus."

The following is the history of a case in which quick and easy labour was experienced after presacral neurectomy.

Case Record

In 1932, at the age of 20, the patient's first child, a boy weighing 9½ lb., was born after a very distressing labour lasting six days. Her second child, a girl weighing 8¼ lb., was born in 1934 after a labour of four days. Since the birth of the first child she has had frequency of micturition. Since the birth of the second she has had "bad pains in the stomach," and for this reason was examined in November, 1936. She looked ill and pale, with dark rings around her eyes. Her appetite was poor. Her bowels were constipated but yielded to paraffin. There was some vaginal discharge. Menstruation had begun at the age of 12 and had always been irregular and sometimes excessive. The bleeding lasted seven days and recurred at intervals of between three and five weeks. Seven days before each period there was severe spasmodic pain in the hypogastrium, which got worse until the first day of the discharge, when it gradually improved for five days. Twelve days of pain seemed to be the only constant point about her menstrual history. She dared not go out for fear of the pain, which compelled her to sit down until it eased. Twice in the previous year she had fainted from the pain. During the two pregnancies she had had the same hypogastric pain for one day once a month.

She was of slight build and her abdomen was tender all over. The lumbar spine was kyphotic and she complained of backache. Her own doctor believed he had observed mild attacks of appendicitis. The cervix was typically multiparous, a little hardened, and pointed downwards and backwards. The uterus seemed tender and there was definite tenderness in both vaginal fornices.

In January, 1937, abdominal exploration was undertaken rather unwillingly. An appendix—not obviously very abnormal—was removed. The ovaries appeared natural. Ligatures were applied to both grossly varicose pampiniform plexuses. The presacral nervous plexus was resected in the surrounding fibrous tissue. She recovered smoothly. The pulse rate varied between 72 and 120, the latter figure on the sixth day. In February, 1937, the patient recovered her appetite and was obviously much fitter. In April, 1937, pains in the knees were troublesome. In June, 1937, she reported that menstrual pains were negligible, but complained of pain in the small of the back and ribs. Her bowels were regular without the use of paraffin.

In April, 1938, she reported missing one menstrual period, the last being on March 6, 1938, but in May she said she did not feel as if she were pregnant. The whole of the right long saphenous vein was enormously dilated from the groin downwards to the dorsum of the foot. There was no cough impulse. Much aching occurred in the leg and she was also complaining of a throbbing in the right wrist and palpitations in the chest. In June, 1938, she was admitted to hospital and under local anaesthesia the right saphena varix was ligated and morrhuate injected below the ligature and again below the level of the knee and ankle. Her pulse rate varied between 80 and 104 during the three days in hospital.

The uterus was now enlarged to about the size of a three-months pregnancy, but still she did not think she was pregnant. She then told us that in August, 1937, she had been fitted at a birth control centre with a cap pessary and had also used jellies. But the second cap pessary she was given was not fitted, though it looked exactly the same. She had continued to use pessaries of "cocoa butter."

On December 9, 1938, at 8 p.m., she went to pay her doctor a bill. She was limping with right-sided sciatica, which she had had for two weeks. She went home to bed and slept, but had some cramp in the right thigh. At 1 a.m. she awoke to find herself "drenched with water." She walked about for

half an hour and "the colours came." About ten minutes later there were three bad pains and a baby boy of 8½ lb. was born. The afterbirth came in ten minutes. There was no great bleeding and there were no after-pains. "Everything was cleared up in one and a half hours and I was back to sleep again."

In September, 1939, she looked very well. There has been only one menstrual discharge since the birth of the last child, and it was not painful. There are no pains in the stomach, the bowels are regular without paraffin, and the varicose veins have disappeared. She still has palpitations and she cannot hold water longer than one hour. The rheumatism has nearly gone, which she ascribes to her new dry council house.

Commentary

Presacral neurectomy is very successful in the cure of a certain type of painful menstruation. The above case history illustrates this. The exploration was not undertaken very willingly because she had all the appearance of becoming a woman with chronic abdominal and pelvic symptoms. She was also liable to an unstable pulse rate and pains which are called rheumatic. In spite of her successive babies being somewhat smaller, it does appear that the neurectomy must have been the factor producing the easy and quick labour for the third child.

The type of dysmenorrhoea cured by presacral neurectomy has been called central plexalgia—a question-begging nomenclature—but there can be little doubt now that the term enshrines experience. One has the impression that it occurs in women who are not likely to marry and if married are not likely to have children. To convert such an impression into an ascertained statistical fact would be laborious and especially difficult, as the indications for the operation are by no means common. A logical difficulty, but not of great importance, is that the operation is often combined with some other surgical procedure. In one of Reeb's cases and in the case reported there was a history of mild appendicitis. It would not be right to associate central plexalgia with appendicitis, but rather with some unsatisfactory state referred to the abdominal organs.

Conclusions

Presacral neurectomy has no bad influence on any part of the process of pregnancy.

In some patients, probably only a small proportion, the first stage of labour is painless and rapid or else unobserved.

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Closed Cerebral Injuries.—Reduction of the intracranial pressure to normal by repeated lumbar punctures is the mainstay in the treatment of closed cerebral injuries, according to Kallius. Several illustrative examples of cases so treated are given, and the results are said to be uniformly good. Systematic re-education in convalescence by graduated exercises must be carried out until the patient returns to his former occupation.—Conservative Treatment of Closed Cerebral Injuries. H. U. Kallius.—*Beitr. klin. Chir.*, May 31, 1939, **169**, 428.

SULPHAPYRIDINE IN THE TREATMENT OF ACUTE URETHRITIS

BY

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Since the introduction of sulphanilamide, uleron, sulphapyridine (M & B 693), etc., into medicine, innumerable articles lauding these preparations in the treatment of all kinds of diseases have appeared in the medical and lay press; one or other of these drugs has even been termed specific for the common cold. There is no doubt, however, that they are of especial value in pneumonia, meningitis, and gonorrhoea. With the last-named of these I am dealing in this paper, and I believe that a short account of 100 consecutive cases of male urethritis treated with sulphapyridine without thought of publication from start to finish might be of interest and value. These cases have not been selected in any way, but have been treated by the method in use at this clinic since sulphapyridine became part of the routine treatment for gonorrhoea.

Treatment

On the patient's first attendance, if the urethral discharge has been present for less than seven days, pil. euflavine 1/2 grain is given thrice daily, and complete lavage with mercury oxycyanide 1 in 8,000 is carried out once daily for a week; then follow fourteen days of sulphapyridine administration (with instructions as to diet and laxatives), 2 grammes a day (four tablets) only being given. During the first seven days of this fortnight mercury oxycyanide irrigations are continued, and for the second week potassium permanganate 1 in 8,000 is substituted; all irrigations are given at a temperature of 105° F. If the infection has been present for more than seven days at the time of the first attendance sulphapyridine is started at once and is given for fourteen days as described above.

Whatever length of time the disease has been present when the patient is first seen, in the absence of acute or subacute posterior urethritis the mode of irrigation remains the same, so that in cases where the condition has existed for more than a week the third week of irrigations—that of potassium permanganate—is not accompanied by chemotherapy. The remainder of the treatment applies equally to all cases.

At the end of the third week an oxycyanide lavage is given, after which prostatic massage is performed (provided always that the urine is clear) and the resultant bead examined. If the bead is negative for pus and gonococci the patient is given complete lavage with silver nitrate 1 in 10,000 for three days, followed by anterior irrigation for a further three days with 1 in 5,000 silver nitrate; he then has a week without any treatment and is advised to take alcohol in moderation.

On his return the gonococcal complement-fixation test is made and he is given an intradermal injection of a 200-million dose of a pure gonococcal vaccine as a provocative. In a further two days the arm is examined for local reaction, and a Béniqué sound is passed and the left vesicle massaged, the resulting bead being microscopically examined. On the next day the right vesicle is similarly treated. If there is no urethral discharge following the silver nitrate or the alcohol, no discharge or local reaction following the vaccine, a negative complement-fixation test, an easy passage of the sound, and pus and gonococci are absent from the vesicular beads, the patient is considered to be cured. It will be seen, therefore, that if a patient

attends regularly and passes all the tests on the first occasion, the time taken from the first attendance to that of discharge is between five and six weeks.

Results

This method of treatment has produced 96 per cent. of cures in the series of 100 cases, divided into 64 per cent. absolute cures and 32 per cent. apparent or clinical cures (those who failed to return for some of the final tests but whose urine was clear, and who had passed all tests until they defaulted). The percentage of failures was therefore 4. Three cases developed a rash towards the end of the second week, one had severe mental depression, and three complained of considerable nausea. One of those with a rash defaulted before final tests had been carried out, but the rest of those who suffered from treatment complications were completely cured.

It must not be thought that all the cures were established in between five and six weeks: many of the patients were not regular in their attendances, and consequently their cure took varying longer periods. The four failures are not ascribable to any fault in the method of treatment, but in three cases were due to gross irregularity of attendance, and in one to a probable reinfection, to which the patient would not admit. No patients who defaulted before the prostatic bead was examined are included, since there is no means of estimating their condition.

If these results are on an average better than those obtained elsewhere it would appear that this is due to the following reasons: (1) No attempt was made to discover the shortest time in which it is possible to obtain a cure by the use of sulphapyridine. (2) Natural immunity was allowed to be in the ascendant before chemotherapy was begun. (3) Four tablets daily of sulphapyridine are actually more effective therapeutically than any other number. (4) Irrigations at a constant temperature of 105° F. were given daily for the first four weeks.

Commentary

In the modern treatment of gonorrhoea there is a growing tendency to cut irrigations down to a minimum and in some cases to dispense with them altogether. This may be justifiable in private practice, where the intelligence of the patient is as a rule above the average and where the personal success of the venereologist is often directly dependent upon rapidity of cure. On the other hand, as it has taken years of propaganda to make the public realize to some extent the seriousness of venereal diseases, it seems a thousand pities suddenly to undo all that good work by informing them that gonorrhoea can now be cured by taking a few tablets. It is surprising how many patients of the clinic class (and they form the large majority of V.D. sufferers) even to-day have little or no appreciation of the difference between gonorrhoea and syphilis.

If clinics cut down irrigations to a minimum or dispense with them altogether there will without doubt be a greater incentive for patients to cease attending as soon as the discharge has stopped: all venereologists must know of many a case in which this has occurred after two or three tablets of sulphapyridine. If the only use of lavage in modern clinic practice is to give the patient something to attend for, then it does serve a very useful purpose. Allowing the patient to think that gonorrhoea is of no account will in the end only lead to greater promiscuity, with a consequent increase in both gonorrhoea and syphilis

Addendum

Since the completion of the above article it has occurred to me that a report on 100 cases may not be very convincing. Accordingly a further series of 150 consecutive cases has been analysed, and these have shown a similar result. Furthermore, the country is now at war. Previous wars have invariably been responsible for a marked increase in the incidence of venereal disease, and although that increase has not been noted as yet, that is no foundation for believing that none will occur. As all thinking people must realize, times of national stress are very apt to upset and undermine moral standards. Taking these facts into consideration, together with the fact that the great majority of male venereal disease is to be found in otherwise healthy men of military age, it would seem that a short and successful method of treating gonorrhoea is of even greater importance now than at the time when this article was written (just before the outbreak of hostilities). While not maintaining that the method advocated is incapable of improvement, it would seem a significant fact that it has stood very satisfactorily a test of twelve months, and the results obtained have been consistently good.

My grateful thanks are due to Dr. Fraser, medical officer of health, and to Dr. A. O. F. Ross, senior V.D. medical officer, both of the City and Port of Liverpool, for permission to publish the figures in connexion with the cases.

RESULTS OF TREATMENT OF GONORRHOEA WITH SULPHAPYRIDINE

FURTHER OBSERVATIONS

BY

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Since I published the preliminary results of the treatment of sixty-five cases of acute gonorrhoea by means of sulphapyridine (M & B 693) in the *Lancet* last November 246 further cases in all stages of the disease have been dealt with. The results of these have been more in conformity with those published by other observers. In the early series of cases I obtained only 57 per cent. of cures, but in the light of further experience this requires some explanation. In the former series cures were considered to be only those cases which responded to one course of the drug—that is, a course of 3 grammes (six tablets) daily for six days with or without irrigation. Since then a larger number of cases have been treated, the routine being to give 3 grammes daily for the first week, followed by 1.5 grammes daily for the second week. In almost all cases irrigations of 1 in 8,000 oxycyanide of mercury at a temperature of 105° F. were employed in addition. The cases were under observation at the Seamen's Dispensary or at Mill Road Infirmary, Liverpool.

Results

Cases were divided into "acute" and "chronic." Those classed as acute were all patients reporting at the clinics who had received no previous treatment for their disease and in whom gonococci were found to be present; those classed as chronic had received various degrees of treatment before reporting. In this latter group gonococci were not invariably found, but there was good reason to

believe that each case had been one of undoubted gonorrhoea. Most of these cases had had other types of treatment; many had already received drugs of the sulphanilamide type, but in no case had sulphapyridine been given. Of the 246 patients forty-one defaulted too early to assess the value of the drug, and they have been omitted from the final tables of results. The remainder have been divided into cures, apparent cures, and failures or relapses.

TABLE I.—*Showing Results of Treatment*

	Acute Cases		Chronic Cases		Acute & Chronic	
	No.	%	No.	%	No.	%
Cures	101	63.0	35	77.7	136	66.3
Apparent cures ..	47	29.5	2	4.4	49	24.0
Failures or relapses	12	7.5	8	17.9	20	9.7
Total ..	160		45		205	

TABLE II.—*Results obtained if Apparent Cures are considered to be Real Cures*

	Cures		Failures	
	Number	Per Cent.	Number	Per Cent.
Acute	148	92.5	12	7.5
Chronic	37	82.1	8	17.9
Total	185	90.3	20	9.7

"Cure" required the patient to have completed all treatment, after which a rest period of one week was allowed, during which time all dietetic restrictions were removed and alcohol was no longer forbidden. At the end of this rest period the patient submitted to a full test of cure, which consisted of provocation by means of a pure gonococcal vaccine, the passage of urethral bougies, and careful massage of the prostate and seminal vesicles, with microscopical examination of the respective secretions. One would have liked, in addition, to make cultural tests on all cases, but certain technical difficulties could not be overcome. In the near future, however, we hope that this additional safeguard will not only be possible but will be a routine measure at the clinics. An "apparent cure" was considered to be a case in which the patient completed treatment satisfactorily but failed to return for the tests of cure or to complete all the tests before defaulting. In every such case in this series there was no urethral discharge and the urine was clear without threads at the time of the last visit to the clinic. Failures were those cases which after a reasonable time persisted with a urethral discharge, continued to pass a hazy urine with threads containing pus, or developed complications. Some of these cases did subsequently clear up, but there was no reason to suppose that the course of their disease had been favourably influenced by the drug in question. Complications were singularly few, and toxic reactions were seldom encountered. The proportion of cases exhibiting toxic symptoms due to the drug remained, as before, slightly under 6 per cent. This figure is much lower than that generally accepted, but as a large number of the patients were seafarers their hardiness may no doubt have had some bearing on this fact. While I am unable to produce any accurate figures it is noteworthy that the percentage is considerably higher in the case of private patients.

Most of the early acute cases were treated by sulphapyridine from the very beginning of their infection—many on the first day. The results compared well in every way with those obtained in cases treated later, and in my opinion it is quite unnecessary to delay the administration of this most valuable drug. Many of the patients improve in a truly remarkable fashion and are free from discharge within twenty-four or forty-eight hours after starting treatment. One cannot, however, too strongly emphasize the necessity for continuing treatment for a reasonable period after this desirable stage has been attained and cannot too strongly deprecate the so-called "quick cures." Needless to say, very thorough testing is necessary to ensure that the cure is complete.

Summary

A very high percentage of cures can readily be obtained with sulphapyridine provided the drug is not withdrawn too early.

A satisfactory scheme of dosage appears to be 3 grammes daily for one week, followed by 1.5 grammes daily for a further week.

Patients appear to improve more satisfactorily when irrigations are used in addition, but the advantage is not very great.

Complications during treatment are rare.

Toxic reactions to the drug are not more than 6 per cent.

Cures can be obtained in 92.5 per cent. of early acute cases and in 82.1 per cent. of chronic cases in all grades of severity.

No preliminary waiting period is necessary or indeed advisable.

I would like to express my thanks to Dr. A. O. Ross for allowing me the facilities to carry out this investigation and for the use of the results obtained at Mill Road Infirmary; and to Dr. W. M. Frazer, medical officer of health for the city and port of Liverpool, for permission to publish these results.

Clinical Memoranda

Rupture of Subphrenic Abscess into the Lung: Bronchoscopic Drainage: Recovery

The acute secondary rupture into the lung of a subphrenic abscess treated successfully by bronchoscopic drainage and followed by recovery appears to be relatively uncommon. Steele (1937) in a ten-year period at the University of Michigan Hospital managed to collect six cases of rupture into the lung out of forty-eight cases of subphrenic abscess. This represents a frequency of 12.5 per cent., and is about the figure given by most observers (Cauderay, 1902; Piquand, 1909). Beye (1932), however, in a series of thirty-one cases, which were presumably late, reports rupture found at necropsy in as many as fifteen.

The accepted method of treatment (Steele, 1937) is immediate free surgical drainage of the original subphrenic abscess. An important accessory treatment, however, is bronchoscopic aspiration of the secondary collection of pus from the bronchial tree (Christopher, 1938). In cases in which the rupture into the lung causes sudden and extreme respiratory distress on account of the quantity of pus invading the bronchial tree, timely bronchoscopic aspiration may be life-saving. This point is illustrated by the following case.

CASE HISTORY

A normally developed youth aged 16 was admitted to hospital on November 16, 1938, on account of abdominal pain of three and a half days' duration. There was no history of previous illness. On examination his general condition was good; temperature 99°, pulse 102, respirations 24; his

heart and lungs appeared to be normal. A tender mass was palpable in the right iliac fossa, with slight rigidity of the right rectus abdominis. A diagnosis of appendix abscess was made and the expectant method of treatment was adopted. Forty-eight hours after admission to hospital operation was decided upon owing to the persistence of the pain and the fact that the pulse was rising. Drainage of the abscess was instituted through a small muscle-splitting incision. Spinal anaesthesia was employed (heavy percaine 1.7 c.cm.). As the abscess was very large and the pus thick and apparently shut off drainage alone was performed, the appendix itself not presenting. The abdomen was closed with a tube-and-wick drain in position. For the next sixteen days much pus drained from the wound, but a swinging evening temperature continued which gradually rose to between 102° and 103° F.; the pulse varied between 80 and 105 and the respirations were steady at about 20.

On December 3 there was slight dullness and restricted movement at the right lung base. On the 7th this appeared to be more pronounced, and a radiograph revealed a (?) right-sided subphrenic abscess. There was no pain in the shoulder.

On December 8 at 6 p.m. an operation was performed under intravenous pentothal sodium anaesthesia. An incision was made below and parallel to the right twelfth rib and a small collection of pus was found in the right infrahepatic space. The suprahepatic spaces were difficult to explore (Ochsner and Graves, 1933). A small collection of pus was seen, and it was assumed that this was the whole of the abscess, but from further findings this was probably not the case. A large tube was inserted and the wound was closed. At 11 p.m. the patient's general condition was poor. His colour was greyish, respirations were quick and gasping, and he seemed to be almost moribund and drowning in fetid sputum, which he hardly had the strength to cough up. Drainage through the operation wound had been practically *nil*. Diagnosis of rupture into the lung through the diaphragm was made, and a consultation was held as to the best line of treatment. The question of suction of his air passages through an endotracheal tube was discussed, but this was rejected on account of the likelihood of spreading unnecessary infection into the bronchial tree. Bronchoscopic drainage was decided upon; this was performed by Mr. E. W. Peet under local anaesthesia with 5 per cent. cocaine. Through the bronchoscope pus could be seen welling up from the right lower bronchus, and a certain amount of this material, very thick in consistency, was aspirated, suction being made several times over a period of about three-quarters of an hour. The patient was strikingly relieved by this procedure. Breathing was easier, his colour was better, and he was now able to talk and cough more easily. He was returned to the ward.

The improvement was maintained during the next day. A moderate amount of purulent sputum was present, but this was coughed up easily. The temperature was 100° to 101°, pulse 130 to 150, and respirations 30 to 40. On December 10 the patient was still coughing up foul "pea-soup" sputum, and he complained of a sore throat. On the 11th his cough was less troublesome and he looked generally better. From this point improvement was continuous. The temperature finally settled on January 10, 1939, and the patient was discharged on January 19. He was subsequently seen in the out-patient department, when his condition was satisfactory.

COMMENTARY

Here is a case in which bronchoscopy seems to have proved the factor in favour of recovery. The patient's condition before bronchoscopy was desperate, but afterwards there seemed a moderate chance of his survival. This was borne out by his subsequent progress. The important points in connexion with bronchoscopic aspiration seem to be: (*a*) the incomplete drainage of the subphrenic abscess by the loin—only a small amount of pus was found and very little drained afterwards for the first week to ten days; (*b*) signs of rupture into the right lung with acute respiratory distress, immediately relieved by bronchoscopy; (*c*) gradual improvement and recovery following this point.

We wish to thank Mr. H. A. B. Whitelocke for permission to publish this case.

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A Full-term Unruptured Ectopic Gestation

The difficulty in arriving at a diagnosis and the rarity of this condition are my reasons for recording the following case.

A negress aged 42 was admitted to hospital with a history of full-term pregnancy and lower abdominal discomfort which appeared to be early manifestations of labour. The woman, a 6-para, gave a description of a perfectly normal pregnancy, her last pregnancy, which was normal, being eleven years previously. Clinically the woman was of poor general condition. The temperature and pulse were normal. The abdominal pains she was complaining of were slight and diffuse. On abdominal examination there was an easily movable tumour coming out of the pelvis resembling a full-term pregnant uterus. Closely attached to this tumour in the right iliac fossa above the pelvic brim was a smaller hard, smooth, well-defined lump. No definite foetal parts could be felt and no foetal heart sounds were heard. The breasts were poorly developed. Vaginally the cervix was high up, slightly anteverted, "admitted a sixpence," and was of the fibrotic chronic inflammatory type but with oedematous and soft edges. The fornices were normal and no foetal parts could be felt. Examination of the urine showed the presence of a good deal of sugar (lactose). An *x*-ray examination demonstrated a foetal skull above the pelvic brim and also a shadow in the position of the smaller tumour, mentioned above. The most probable diagnosis, I suggest, was the first stage of labour in a full-term uterus complicated by a fibroid which was preventing the foetal head from entering the pelvis.

I performed a Caesarean section. A full-term dead female foetus (7 lb.) was extracted from what at first appeared to be a smooth, fairly thin, unhealthy uterus with a fibroid closely attached to its surface. There were no adhesions and no intraperitoneal haemorrhage.

On closer examination the so-called fibroid proved to be the uterus, about three times the normal size, and the foetus had been extracted from a sac formed by the unruptured left Fallopian tube. The placenta, which was thin and very diseased, extensively covered the walls of this sac and was closely adherent. The wall of this tubal sac was much thicker than I should have expected, but its blood supply must have been poor, as there was very little bleeding on incision. I removed the sac.

The patient made an uninterrupted recovery.

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Tuberculosis in Pregnancy.—The practice in America is increasingly to treat tuberculosis conservatively during pregnancy. Collapse therapy is apparently safe during pregnancy, and often produces striking improvement.—Collapse Therapy for Tuberculosis in Pregnancy. R. S. Siddall and W. J. Balzer. —*Amer. J. Obstet. Gynec.*, May, 1939, **37**, 741.

Reviews

SCLEROSING THERAPY

Sclerosing Therapy. The Injection Treatment of Hernia, Hydrocele, Varicose Veins and Haemorrhoids. Edited by Frank C. Yeomans, M.D., F.A.C.S. (Pp. 337; 117 figures (185 illustrations. 27s.) London: Baillière, Tindall and Cox. 1939.

Therapeutic ideas and particular methods of practice tend to recur at intervals. It is some time since good port was injected into hydroceles or boiling water into toxic goitres, and the rise of aseptic surgery did much to overshadow what soon came to be regarded as rather barbarous practices. Within the past ten or fifteen years, however, there has been a recurrence of the practice of injection therapy. The editor of the present work tells us that sclerosing therapy has emerged from the stage of experiment and empiricism and is now well established on a scientific basis. In an attractive and very readable form he has arranged for us a volume of convenient size consisting of four parts dealing with the injection treatment of hernia, hydrocele, varicose veins, and haemorrhoids, respectively. The authors responsible for these sections in the order already given are Arthur F. Bratrud of Minneapolis, George F. Hoch of New York, Harold J. Shelley of New York, and Frank C. Yeomans, the editor of the whole volume, who occupies a chair of proctology in New York. The book is well illustrated with photographs and black-and-white diagrams, a list of references is given at the end of each section, and the index, like the text, is also divided into four parts. The sections are uneven in length, hydrocele and haemorrhoids together taking up only a small fraction of the text. The assertion that "it is safe to say that the injection treatment for hydrocele will supplant operation in most cases" is not likely to be generally accepted, particularly as the painful nature of the procedure has given rise to comment. The case for the injection treatment of haemorrhoids is well put, and detailed consideration is given to the treatment of hernia and varicose veins.

Not the least interesting parts of the book are the accounts of the history of injection treatment. The text is clear, easily read, and well set out in headed sections. This volume should prove a useful guide and a valuable work of reference. On the whole the arguments for and against injection therapy in relation to methods of treatment are well put, but, as might be expected, some bias may be detected in favour of sclerosing.

OBSTETRICS AND GYNAECOLOGY

Combined Textbook of Obstetrics and Gynaecology. For Students and Medical Practitioners. Revised and rewritten by J. M. Munro Kerr, R. W. Johnstone, James Hendry, Dugald Baird, James Young, Donald McIntyre, and E. Chalmers Fahmy. With additional contributions by Charles McNeil and G. Jackson Wilson. Third edition. (Pp. 1,192; 499 illustrations and numerous *x*-ray plates. 37s. 6d. net, postage 10d.) Edinburgh: E. and S. Livingstone. 1939.

The first edition of the *Combined Textbook* was published in 1923 for the expressed purpose of correlating more closely the study and practice of obstetrics and gynaecology. With the foundation of the British College of Obstetricians and Gynaecologists six years later a powerful stimulus was given to the recognition of these two subjects as a special branch of medicine and surgery, and this stimulus has already produced results throughout the British Commonwealth of Nations. The need for first-class textbooks has increased with the wider interest taken, and the new revised third edition worthily contributes towards meeting this need. Basic principles are carefully and clearly discussed, but in addition the book is filled with practical details of the greatest importance in the teaching of students. Especially is this the case in the obstetrical section, in which those chapters dealing with toxaemia, dystocia, and trial of labour deserve particular mention; they are excellent. The value of *x*-ray pelvimetry at the present stage of its development is impartially discussed, and emphasis is placed on the need for a sound practical training and experience before the accessory aids to obstetric practice can be utilized to the best advantage. Minor criticisms can be made. Nystagmus and its importance in hyperemesis are not mentioned; neo-natal jaundice and foetal dropsy are poorly described; pituitrin is advocated in the treatment of obstetric shock; and in an attempt to make the illustrations easier to understand the diagrams showing the application of forceps rather portray how forceps should not be applied.

The gynaecological section of this book is not so uniformly good as the obstetrical one. Dysmenorrhoea, malignant conditions of the uterus, and ovarian pathology are splendidly discussed, but the description of operative work is disappointing. In places it rather resembles a brief conducted tour round a museum of historical curiosities. It is admittedly difficult to know how much students should be taught of operative technique, but there seems little justification for teaching them six different methods of operating on a retroverted uterus, and it is regrettable that the only illustration given of the technique of myomectomy should show a long incision on the posterior uterine wall. It should not be difficult to improve this section of the book; but in making this criticism it is only fair to state that in their preface the authors emphasize the fact that operative technique can be mastered only by postgraduate association with experienced operators.

We conclude by offering one general suggestion for the improvement of subsequent editions. More liberal acknowledgment of the pioneers in the subject, and carefully compiled references to their work and to the literature, would enhance the value of an already excellent book.

GROSS ANATOMY

Gross Anatomy. A Brief Systematic Presentation of the Macroscopic Structure of the Human Body. By A. Brazier Howell. (Pp. 403; 56 figures. Cloth, 25s.) London: D. Appleton-Century Company. 1939.

The general scheme of this work by Professor A. Brazier Howell of the Johns Hopkins University School of Medicine differs considerably from the traditional methods of the older textbooks of anatomy, and the change is stated to have become necessary owing to the progressive curtailment of the time allotted for the study of gross anatomy. Thus, while formerly it was customary to allow 1,000 hours for the study of anatomy, this has now been reduced to from 300 to 500 hours. This obviously retrograde change entails a change in the methods of teaching anatomy, and also (it is said) in the methods of presenting the subject in the textbooks used by the students. The author of the present work has endeavoured to meet this difficulty by concentrating attention on fundamental facts and principles rather than attempting to give a complete account of all the minute details of muscular attachments and of the relations of every vessel, nerve, and viscus. He has also introduced some interesting references to the comparative anatomy and phylogeny of such structures as the pectoral and pelvic girdles, and to the influences

which the movements of the body, and the position of the main nerve cords and correlated muscular groupings, have in the moulding of the osseous framework. The student, however, who seeks to become a practical surgeon requires in his textbook some indication of what anatomical points will be useful to him in after-life.

Unfortunately there is a tendency in some modern textbooks—in the endeavour to keep strictly to the larger issues—to omit many details of anatomy, a knowledge of which may be of very great importance from the practical standpoint of operative work. There is also a tendency to relinquish any attempt to illustrate adequately the textbooks which are recommended for use by students in the dissecting room, and to shift the responsibility of illustration on to the supplementary atlases of anatomical plates, which, however excellent from the artistic standpoint, lack the full descriptive text, with accompanying clear-cut figures, found in the older manuals and standard works on systematic, regional, and applied anatomy. The aim of the latter is to set a high standard of good practical work in the dissecting room, which will help the student at a later stage in his curriculum to reap the full benefit of the further training which will enable him to operate with safety on the living subject. The book we are considering is in many ways admirable, but it will be deplorable if curtailment of time allowed for the study of anatomy is to be reflected in an abandonment of the detailed descriptions that characterize the old-style anatomical textbooks. The remedy is obvious: adequate time should be allowed for the proper study of a fundamental subject.

The author of *Gross Anatomy* has endeavoured to counter the difficulty which the modern medical student finds in selecting what, among the multifarious mass of details, it is essential for him to know by presenting the material in such a way that it is easy to understand from the morphological and physiological aspects, and has thus added interest to the study of anatomical facts, which, when considered without special reference to function and morphology, often appear meaningless. The familiarity with the details of anatomy which is needed for operative work can, however, only be acquired by supplementing the morphological approach to anatomy by practical instruction under the superintendence of teachers who have themselves had experience in surgical practice.

THE FERMENTS

Die Fermente und ihre Wirkungen. By Professor Carl Oppenheimer. Supplement No. XI; vol. 2. (Pp. 1583–1738, and X; 21 figures. 10 florins.) The Hague: Dr. W. Junk. 1939.

Die Fermente: Supplement. Bibliographie. 1924–1938. (Pp. 128. 10 florins.) The Hague: Dr. W. Junk. 1939.

The appearance of the eleventh part and the author-index of the Supplement to "Ferments and their Actions" marks the completion by Professor Oppenheimer of a very laborious task. The fifth edition of Oppenheimer's Encyclopaedia appeared during the years 1924–6, and the supplement, which has now been completed, reviews in a volume of 1,800 pages the advances in knowledge made during the years 1924–38. The scope of the literature reviewed may be judged from the fact that the author-index occupies 128 pages and contains nearly 5,000 names. As these figures indicate, research on ferments has been very active during the past fifteen years. The subject has indeed developed into a special science that forms the foundation of a large part of biochemistry. The chief disadvantage of intense research activity is that it quickly swells the literature to unmanageable dimensions, and it is impossible for even a specialist on ferments to be conversant with all the work that is being carried out on this subject; hence Oppenheimer's encyclopaedic work is almost as indispensable to the ferment chemist as is Beilstein to the organic chemist. One can only admire the amazing industry of the author and congratulate him upon the completion of an important stage of his work.

AMERICAN PUBLIC HEALTH ADMINISTRATION

Community Health Organization. A Manual of Administration and Procedure primarily for Urban Areas. Edited by Ira V. Hiscock. Third edition. (Pp. 317. 10s. 6d. net; 2.50 dollars.) London: Oxford University Press; New York: Commonwealth Fund. 1939.

The systems of public health administration in the United States of America are largely different from that of this country. They are systems and not a system, and they are characterized by diversity rather than uniformity. The Federal Government has certain health functions, but the care of the public health is regarded primarily as the responsibility of each individual State. In many States the county is the important unit of health government, with a varying measure of autonomy. The State may delegate to municipal corporations more or less complete control over local health conditions. Even in towns there are at least three forms of municipal government—the mayor and council system, the commission form, and the city manager plan. Health offices are variously appointed in the State, the county, or the city. The personnel of administration and the services provided under these different authorities vary greatly in character and efficiency; and, certainly till 1936, when the Social Security Act made funds available for the development and stimulation of public health services, it is true to say that only a small proportion of health departments had provided for even a minimum of the community requirements.

In these circumstances there is no wonder that American public health administration has not been understood in this country except by a few medical officers who have had the opportunity of investigating it at first hand over a considerable period and in different parts of the United States. Very welcome, therefore, is a book entitled *Community Health Organization* edited by Ira V. Hiscock, Professor of Public Health in the Yale University, and published under the auspices of the Commonwealth Fund and in this country by the Oxford University Press. It is in its third edition, but the previous editions are not well known here and most of the chapters have been substantially rewritten. The book is described as "a manual of administration and procedure primarily for urban areas" intended mainly for "health officers, public health nurses, and teachers of public health." It is an admirable standard handbook for these purposes and persons, but it is more than this. It expounds and describes principles and methods of health administration in such clear and orderly fashion that it is not merely an excellent textbook for those engaged in or entering the public service, but a very interesting volume for others who concern themselves in any way with the wide questions with which it deals. Its format is good, and it is not too long or over-detailed. It covers all the health services with which we are familiar in their different forms on this side of the Atlantic, including those relating to maternity, the school child, and hospitals, as well as to mental hygiene and welfare. One relevant matter, however, seems to be conspicuously absent throughout—the relationship of these various activities to the work of the private medical practitioner.

Notes on Books

The little manual on *Nursing in Time of War*, by Mr. P. H. MITCHINER, surgeon to St. Thomas's Hospital, and Miss E. E. P. MACMANUS, matron to Guy's Hospital, contains in a small compass a large amount of useful information on the following subjects: nursing in first-aid posts, burns and gas, wounds, shock and infection, fractures, medical casualties, and the technique of intravenous transfusion and infusion, with appendices on drugs, dressings, instruments and equipment, lotions, operating theatres, and improvisations. The book is published by J. and A. Churchill, Ltd., at the price of 1s. 6d.

The well-known textbook entitled *Human Pathology*, by HOWARD T. KARSNER, has appeared in its fifth edition. This popular work is orthodox both in arrangement and in the views which it expresses, and it is characteristic that although considerable revision has taken place, some of the more controversial of recent developments in the study of pathology have not been introduced. An unusual feature is the very long list of references with which each chapter concludes: the older and less important of the papers cited might have been omitted with advantage to the average student. The new edition is published at 45s. by J. B. Lippincott.

Dr. E. C. SMITH, who is lecturer in pathology at the School of Medicine in Lagos, has published a volume entitled *An Introduction to Pathology and Bacteriology for Medical Students in the Tropics* (John Bale, 15s.). Microbiology doubtless predominates in the laboratory study of medicine in tropical Africa, and it is therefore perhaps natural that the greater part of this book should be concerned with infective processes: the method adopted is to describe first the micro-organism and then the lesion which it produces. As might be expected, protozoal infections receive special attention, and there is also a chapter on helminthiasis. The amount of space given to the rest of pathology is comparatively small: the single chapter dealing with "general pathological processes" is unduly brief, and regional pathology is represented only by chapters on the blood, the liver, and nephritis. There are some excellent illustrations, and the book can serve a useful function provided that it is used only for the purpose implied in its title.

Preparations and Appliances

TWO SCHEMES FOR THE TREATMENT OF FRACTURES OF THE FEMUR

Mr. MELBOURNE THOMAS, M.B., F.R.C.S.Ed., medical superintendent, Llwynypia Hospital, Rhondda, writes:

The 1914–18 war forced a quickened interest in the treatment of fractures, especially those of the femur. The possibility of the present war causing large numbers of fractures suggests the advisability of a widespread re-examination of facilities and apparatus designed for dealing effectively with these types of cases. The shortcomings of the conventional arrangements include the following: (1) The "Balkan beam" as ordinarily designed is not a fixed piece of apparatus. It tends to wander about until it comes to rest against bed or wall, in a position where the line of traction is insufficiently controlled. (2) It is unnecessarily obstructive round about the bed, and is either not collapsible for convenient storage or is too elaborate for rapid erection. (3) The nature of its construction, its cost, and storage problems operate against rapid expansion to meet possible contingencies.

At this hospital two schemes have been worked out to overcome the above defects. Both schemes are dependent on attachment to the wall above the head of the bed for anchorage and for support at that end, while in the second scheme the addition of a locking-bar at this site secures stability in the horizontal plane.

COMBINED WARD FEMUR UNIT

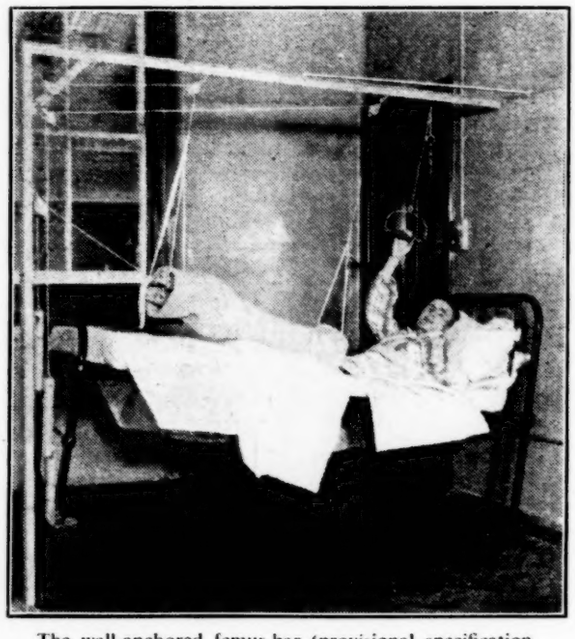
The first, a "combined ward femur unit," is applicable in a ward habitually receiving a number of fractures. It requires the following as permanent fixtures: (*a*) a T-iron section suspended along the length of the ward at a height of about seven feet and extending six inches beyond the foot of the bed; (*b*) a "flat"-iron sunk into the floor vertically below the above; (*c*) a short length of angle-iron—the "wall-bracket"—attached to the wall seven feet above the midline of each bed. These fixtures are suitably drilled. They present no functional obstruction even when the beds are used for other than fracture work. A bed becomes equipped with a "Balkan beam" when a horizontal and an upright member are taken out of storage and are attached to the above structure by two loose pins and one nut and bolt. (For purposes of space an illustration of this unit has not been included.)

The advantages claimed for this scheme are: (1) The extreme ease and rapidity with which a bed can be equipped for the above form of treatment; and, concurrently, the ease of expansion of facilities for such treatment. (2) Absolute rigidity and immobility, so that the direction of the lines of force employed for "pulling out" and "cradling" the limb is under complete control. (3) A reduction to a minimum of the usual obstructions round and about the bed. (4) The ease with which the equipment can be stored. (5) The robustness of the structure and absence of anything likely to require repair.

Arrangements for screening individual beds by curtain are simple with the aid of Section *a* and have proved a welcome addition.

INDIVIDUAL BED UNIT

The second of these schemes, an individual bed unit, is suitable for service in hospitals dealing with smaller numbers of these cases. It requires the preliminary attachment of one



The wall-anchored femur-bar (provisional specification No. 28412).

or two wall-brackets above one or two selected beds. This apparatus, which can be described by some such title as "a wall-anchored femur-bar," is collapsed into linear dimensions when not in use and is very easily stored.

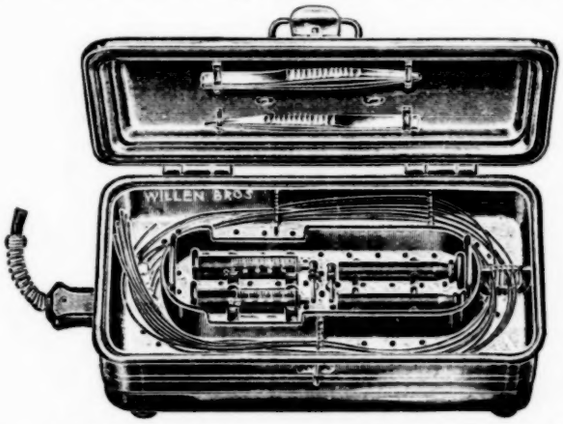
Having ascertained the correct angle of abduction, the apparatus is erected by unfolding and securing with four nuts and bolts. At this hospital this is done by a porter as easily as he erects an extra bed. The accompanying photograph illustrates how the lines of force here called into play yield a simple, clean, and economical mechanical result.

A FORMALIN STERILIZER FOR URETERIC CATHETERS

Mr. H. P. WINSBURY-WHITE, F.R.C.S., writes:

In devising this ureteric catheter sterilizer the following requirements have in particular been provided for: an efficient sterilizer which is conveniently portable, and in which any one catheter is easily identifiable and accessible without unduly disturbing the other catheters. It is roughly elongated in shape, and the catheters are laid in a track two inches wide bordering the periphery of a movable perforated tray. The catheters are kept in position by five comb racks spaced equally round the track, each rack having six compartments. This arrangement enables different series of catheters to be segregated according to size, so that they can be readily drawn or lifted out with a pair of forceps.

The space in the tray enclosed by the catheter track is fitted to hold two ureteric catheter syringes and the two metal nipples which will connect catheters and syringes. The perforated bottom of the tray allows a free circulation of the vapour from the formalin tablets, which lie on the floor of the sterilizer. The lid is hinged and edged with rubber so that



when it is closed the interior of the sterilizer is airtight. On its inner aspect are fitted two pairs of dissecting forceps: these are used for the removal of catheters as they are required.

Beneath the floor of the sterilizer is a closed compartment containing the electrical elements for heating. The necessary heat is obtained by plugging the cable into an ordinary electric-light plug. In order to obviate the danger of damage to the catheters by overheating the box, the electrical fitting is so arranged that a temperature higher than 110° F. cannot be obtained by heating for half an hour. When the catheters are to be used it is convenient to lift the tray containing them and the accessories out of the box on to a table covered with a sterilized towel.

A series of experiments carried out by Dr. J. Fine at St. Paul's Hospital laboratory have made it quite clear that sterilization of the instruments inside this apparatus by means of formalin tablets is simple and quick. One essential, however, is that the interior of the box and its contents must be completely dry. With regard to the interior of the catheters, dryness is best safeguarded by first washing through with spirit and then seeing that the whole length of the interior of each catheter is occupied by a wire stylet. Dr. Fine's remarks and the conclusions resulting from his experiments are:

1. *Sterilization of the surface* of objects placed in the sterilizer was tested by placing in it a watch-glass containing some emulsion from a culture of *Staphylococcus albus* and transferring a loopful at intervals on to an agar plate. The time required for complete sterilization varied from twelve to forty-five minutes, according to the volume of emulsion in the watch-glass. Clearly, the greater the volume the longer the time required for sterilization. The minimum period for *B. pyocyaneus* was six minutes.

2. *Sterilization of Ureteric Catheters.*—The time required to achieve this was investigated as follows: A number of catheters were rinsed with a fresh emulsion of an organism. As the catheters were too narrow to take an ordinary rubber teat, capillary pipettes of suitable size were prepared, the narrow end inserted into the catheter, and rinsing done with the rubber teat on the free end of the pipette. The catheters, with stylets in position and with their cotton overalls, were now placed in the sterilizer and at intervals one was removed; the overall and then the stylet were withdrawn and a sterile capillary pipette, with teat, was inserted into one end, while the other end was placed in a tube of sterile broth. The interior of the catheter was next rinsed with the broth, which was incubated for twenty-four hours. It was found, both with *Staphylococcus albus* and with *B. pyocyaneus*, that sterilization was complete in twenty minutes.

3. *Effect of the Number of Formalin Tablets Used.*—In all the foregoing experiments six tablets were placed in the sterilizer, but almost identical results were obtained whether one tablet or six tablets were employed, not more than two minutes longer being required for sterilization when one only was used.

4. *Effectiveness in the Absence of Heating.*—The time required for sterilizing a culture was so short (six to twelve

minutes) as to suggest that results could be obtained without switching on the current. Actually it was found that a culture in a watch-glass could be sterilized in thirty-two minutes without the use of the current (as against twelve minutes with the current). As the sterilizer becomes only slightly warm in twenty-five minutes it would seem that even a small rise in temperature greatly increases the rate of vaporization of one formalin tablet.

5. *Limitation in Use of Sterilizer.*—It was found that a capillary tube of the same width as a ureteric catheter when filled with an emulsion of a living culture was not sterilized even after three hours; a similar result was obtained when only a small amount of fluid was present. Diffusion of the formalin through fluid is thus very slow, and it is therefore essential that the stylet should traverse the entire length of the catheter so as to minimize the likelihood of the presence of a column of fluid.

SUMMARY

The formalin sterilizer under consideration when heated by the electrical element with which it is fitted will disinfect the surface of any object placed inside it in twelve minutes, and the interior as well as the exterior of a ureteric catheter in twenty minutes. Catheters must be properly dried and fully engaged with their stylets to ensure sterilization. A single formalin tablet is almost as effective as are six tablets.

The sterilizer is obtainable from Willen Bros., 44, New Cavendish Street, London, W.1.

THEOBROMINE WITH PHENOBARBITONE

"Theoba" (Burroughs Wellcome and Co.) is a tabloid preparation containing theobromine (gr. 5) and phenobarbitone (gr. 1/2). It is designed as a combined diuretic and sedative for use in conditions associated with high blood pressure.

BRITISH MEDICAL JOURNAL
LONDON
SATURDAY JANUARY 20 1940

THE SUPPOSEDLY STERILE SYRINGE

The widespread use of spirit as a disinfectant, particularly for syringes and scalpels, is a perpetual cause of disquiet to those familiar with the bactericidal properties of alcohol. It is totally incapable of destroying bacterial spores, and from time to time there are records of gas gangrene having been produced by instruments supposedly sterilized by it. So far from being able to kill spores, spirit as used for surgical purposes not infrequently contains living ones. R. Regamey,[1] who has investigated this subject from several points of view, collected thirteen samples of spirit in which syringes were being kept in different university clinics in Berne and was able to cultivate bacteria from twelve of them; in one case the organism found was a pathogenic *Cl. welchii*, although several injections had been given with syringes left in this sample without ill effects. He also describes a series of experiments which show that the spores of both aerobic and anaerobic bacteria, including all the principal pathogenic species, are capable of surviving in alcohol for periods measured at least in months. It is perhaps less generally known that even non-sporing bacteria are resistant to alcohol under certain conditions, and that these conditions correspond to some of those in which spirit is used as a disinfectant in surgery. Endless experiments illustrating this have been performed in the past, but Regamey's results will serve to draw fresh attention to it. When *Bact. coli* was added to the alcohol in the form of a broth culture it was destroyed within fifteen seconds by all concentrations of alcohol between 50 and 99 per cent., and within one minute by 40 per cent. On the other hand, when the culture was dried on silk threads and these were placed in different concentrations of alcohol, only 50 per cent. and 60 per cent. sterilized the thread in one minute; 70 per cent. took three minutes, 80 per cent. fifteen minutes, while in 90 and 99 per cent. the organisms survived for twenty-four hours. Similar results were obtained with streptococci and staphylococci, except that the optimum concentration of alcohol for killing the latter was somewhat higher. These experiments illustrate again the fact that pure alcohol has very little bactericidal activity; it requires to be diluted with water to become effective, doubtless because it cannot penetrate the bacterial cell except in the presence of water. To place dry instruments in undiluted spirit is, therefore, not to sterilize them; the concentration used should preferably be about 70 per cent. How often is this dilution actually carried out? It may be added that for the storage of instruments liable to rust, spirit so diluted would be unsuitable. It may well be asked why, if spirit is so poor a disinfectant, infections traceable to its use are not more common. The same question recently arose in these columns in a discussion of sterilization by heat; it is well known that boiling cannot be depended on to destroy spores. So far as syringes are concerned, the probability is that in normal use they rarely become dangerously contaminated, and if they are employed only for the injection of sterile medicaments, and are otherwise safeguarded from contamination, to suggest that they should be autoclaved before every occasion of use is no more than a counsel of perfection. It is as well, nevertheless, that the limitations of spirit should be more generally understood in order that it may not be depended on in circumstances which demand more effective methods.

Knowledge of the bacterial pitfalls of hypodermic injection receives an important addition in the paper of J. W. Bigger, J. W. S. Blacklock, and H. J. Parish on page 79 of this issue of the *Journal*. Their masterly analysis of the facts and possibilities in the recent Irish case falls into two parts: the items of proof that the living tubercle bacilli which were undoubtedly injected with T.A.F. into a number of children could not have been in this material as supplied by the manufacturer, and experiments designed to discover and illustrate how contamination could have taken place at a later stage. Under the former heading it was established that 0.5 per cent. phenol, the preservative used in this and many other materials, will kill tubercle bacilli gaining accidental access to it within a week, and that these and other bacteria do not survive long even if they are present on a rubber cap before it is waxed. The suggestion that the material used was in fact a suspension of tubercle bacilli and not T.A.F. at all was easily disposed of by showing that such a suspension would have contained enough tuberculin to produce a violent local reaction, whereas no such reaction was observed. The experiments connected with the alternative possibility—that contamination took place during the use of this product—are of great practical significance. It was found that a minute droplet of tuberculous sputum on the *outside* of a needle with which the whole contents of a 25 c.cm. rubber-capped bottle were withdrawn by six successive punctures of the cap infected every dose so obtained. This experiment shows not only that when one is dealing with material containing bacteria a little goes a long way, but that the comfortable idea of contamination being wiped off a needle by passage through a rubber cap is entirely ill founded. Similar contamination of the plunger of the syringe also inevitably infected the contents of the bottle, and surface contamination of the rubber cap

[1] *Schweiz. med. Wschr.*, 1939, **69**, 874.

could be conveyed by the needle to the interior. Perhaps the most striking experiment of all is that in which the interior of a hypodermic needle was infected with sputum containing streptococci and repeatedly immersed in alcohol and washed through with both alcohol and ether; in spite of this treatment, which corresponds to that often accorded to syringes in practice, it delivered twenty-eight successive doses of T.A.F. each containing living streptococci. This experiment undoubtedly illustrates another defect in the action of alcohol: it has no power of penetrating material such as mucus. Accidental contamination often takes the form of a dried film of mucus, pus, or infected blood, and on such a film, however minute, neither spirit nor ether will act effectively. Although these investigations have revealed nothing new in principle, in the precision and far-reaching implications of their detail they are not only new but highly instructive and gravely disquieting.

CHRONIC CONSTRICTIVE PERICARDITIS

A real advance in the treatment of a disease often leads to stimulation of more widespread interest in its general clinical aspects. Two examples of this generalization, chosen at random, are provided by the demonstration of the value of adequate iron therapy in chronic microcytic anaemias and the introduction of practicable methods of radical surgical treatment in bronchiectasis. It may well be claimed that recent surgical advances in the treatment of chronic constrictive pericarditis have awakened such interest in this relatively rare syndrome that many more cases are likely to be recognized in the future. An excellent review of the subject was given by Paul White in his St. Cyres Lecture[1] of 1935. The leading features of the syndrome are the insidious onset of congestive heart failure in a young person, with preponderant hepatic enlargement and ascites; venous engorgement, often with surprisingly little dyspnoea; a heart showing no clinical evidence of enlargement or valvular disease; pulsus paradoxus; radiological evidence of diminished pulsation of the heart and sometimes of calcification in the pericardium; and perhaps a history of a previous acute pericarditis.

A valuable contribution on the surgical treatment of seven cases of chronic constrictive pericarditis, together with a summary of the results obtained in 143 cases recorded in the literature, has recently been made by Heuer and Stewart.[2] As is so often the case, the aetiology in most of their cases was obscure. In one tuberculosis was proved to be the cause; in three the chronic constrictive phase was observed to follow an acute pericarditis with effusion of which the aetiology was not determined; in the rest no information about causation could be obtained. With regard to preoperative treatment Heuer and Stewart found that the most essential point was the removal of fluid; the intravenous mercurial diuretics were usually effective, but occasionally paracentesis was required. Digitalis was considered to be contraindicated except in patients with auricular fibrillation. They used general anaesthesia with ether. The open method was quite satisfactory, even in three cases in which a small opening in the left pleura was made; in view, however, of the possibility of this accident ether was administered in later cases by an endotracheal tube, a procedure recommended by Churchill.[3] In planning the operative approach Heuer and Stewart resect the costal cartilages and adjacent parts of the ribs on the left side, preserving the periosteum and perichondrium, thus differing from Churchill, who removes the perichondrium and part of the sternum. They thus regain a rigid chest wall after operation; this has obvious advantages and seems compatible with perfectly satisfactory restoration of cardiac function. They favour removal of the pericardium over the left ventricle first, and stress the advantages of removing the pericardium in fragments, keeping the line of separation ahead of the cut edge of pericardium so that a flap always remains with which an accidental tear into the heart muscle can be covered. It is interesting to note that they have made no attempt to free the great veins or auricles, concentrating on freeing the ventricles as completely as possible. In view of their good results this suggests that cardiac tamponade rather than obstruction to venous inflow is the chief cause of the disordered circulation in this syndrome. Various arrhythmias and even complete cessation of the heart-beat occurred during the operations; they recommend periodic pauses to allow the heart to recover more normal action. Postoperatively the only complications encountered were a haemothorax, requiring aspiration, and a localized and superficial infection of the wound. All seven patients recovered from the operation; three were cured and three markedly improved, the remaining one having been operated upon too recently for proper evaluation of the result. Quantitative studies of the circulation in these patients and in two others have been published[4]; it was found that in these nine patients the venous pressure was raised, the circulation time prolonged, the arteriovenous oxygen difference increased, and the cardiac output diminished, compared with normal. In the six patients reinvestigated after operation these values tended to or actually did return to normal.

From a survey of the literature Heuer and Stewart found that of 143 patients operated on for resection of the pericardium for chronic constrictive pericarditis reliable data about the result obtained were available in

[1] *Lancet*, 1935, **2**, 539, 597.
[2] *Surg. Gynec. Obstet.*, 1939, **69**, 979.
[3] *Ann. Surg.*, 1936, **104**, 516.
[4] *J. clin. Invest.*, 1938, **17**, 581.

135; of these, 37 per cent. were classed as cured and 23 per cent. as improved, whereas 40 per cent. of the patients died either during or soon after the operation. In view of these figures their results, especially with regard to mortality, are highly creditable. It appears that only eight surgeons have recorded operations on five or more cases. It is thus clear that from the surgical side better results can be anticipated with increasing operative experience; from the medical side wider appreciation of the diagnostic features of the syndrome will result in the recognition of a larger number of cases as belonging to a group so dramatically susceptible to relief by surgery.

CHEMICAL PROPERTIES OF SILICEOUS INDUSTRIAL DUSTS

In an interesting paper read recently before the Royal Society of Arts Professor Briscoe points out that substances other than free silica—for example, asbestos, or the silicates present in anthracite coal dust—can produce disabling changes in the lung akin to those produced by free silica dust, and he says that he is quite unimpressed by the labels "asbestosis" or "anthracosis." He thinks that the likeliest explanation of the whole matter is that both free silica and these silicates have some common constituent or common property which is the real cause of damage to the lung. One of his colleagues, Dr. W. R. Jones, some years ago was led by certain observations to conclude that silicosis was due to the inhalation of sericite, a mica-like mineral. This theory now seems doubtful, but it was Dr. Jones's work that led Professor Briscoe and his colleagues to study critically the chemical properties of siliceous dusts, both safe and dangerous. They set themselves in the first place to devise and perfect methods of sampling which would give them the dust *just as the operatives breathe it*. They have now in use three well-tried and established methods—namely, volatile crystal filters, soluble crystal filters, and the labyrinth. Volatile solid filters are made with naphthalene, acenaphthene, and anthracene; the first mentioned is the best, because it can easily be obtained very pure and can be sublimed completely away from the collected dust at a temperature as low as 70° C.; this is the best way of collecting samples up to 5 milligrammes in weight. Other filters are made of a loosely compacted body of a crystalline solid, preferably acicular, such as acenaphthene or salicylic acid, soluble in a non-aqueous liquid (benzene or alcohol respectively in these two cases); these filters are useful for the collection of samples weighing 50 to 100 milligrammes or more. The labyrinth method is a mechanical method in which the dusty air is drawn simply through a regular array of baffle plates (polished copper) in a duct, and it is used to collect much larger samples, from 10 to 200 grammes. The faster the air is drawn through this device the greater is the proportion of dust in it which is deposited. The dust is removed later from the copper plates by scraping with sharp-edged strips of celluloid. Labyrinth samples are true samples and have the composition and properties of the whole dust. The larger particles of dust are deposited on the earlier sections of the copper plates in the apparatus, but the chemical composition of the dust is the same at both ends of the labyrinth; the solubility of the fine dust at the outlet end is nearly three times that of the coarser dust at the inlet end. This is due to the large surface of the fine dust particles exposed to the solvent. The labyrinth also discriminates between different kinds of suspended particles. When it is used for air which carries granite dust and also a fine mist of liquid water and liquid oil produced by drilling, the oil and water collect on the first few plates of the labyrinth and dust collects on the remainder. This is proof that it is possible to have, even in a saturated atmosphere, dry particles floating separately alongside liquid droplets of water and oil. Examination of the dusts thus collected shows that fine mineral dust, far from being inert and dead, is in fact highly reactive chemically and has curious and interesting properties of solubility; whereas finely powdered granite has a loss on ignition of about 0.5 per cent., the corresponding figure for fine granite dust produced in a tin mine by wet-drilling and blasting is 10 to 15 per cent. This loss of weight is due to water. Evidently the dust particles floating in moist air become highly hydrated. Also this hydration results in a considerable fraction of the silica and alkalis present in the material becoming freely soluble in water. Almost pure silica in a fine dust becomes similarly hydrated; this is due to the minute particles having a surface area which is relatively enormous in relation to their mass. Further, it has been found that with silica and other substances leached from a given mineral the rate and extent of solution are a function, not only of temperature, but of time, of particle size, and of the ratio of solid to solvent. In certain cases also the solution is affected by the presence of carbon dioxide. Mere admixture of materials such as certain metallic powders or some forms of carbon, which might be expected to be inert, may greatly reduce the silica solubility of a given dust. Traces of potash or soda, on the other hand, may largely enhance the silica solubility, and so may traces of lime. Again, the solubility may be localized in certain directions, as at the broken end of an asbestos fibre, where there is a high concentration of alkali. There is some evidence that this soluble alkali may be a damaging factor. By such improvements in the chemical knowledge of industrial dusts it is hoped that more precise information may be obtained about how exactly the various pathological changes produced in the lungs by the different dusts arise. At the same time the biological aspect must also be kept in view. For example, the fact that miners in one region suffer from silicosis and those working in similar mines in another region do not may be due to some difference in reaction of the living lung tissue in the two cases—some other and unidentified factor—and not to fine differences in chemical properties of the particular dusts.

RADIUM POISONING

The danger of poisoning by radium has waited very much longer for recognition than the dangers of repeated exposure to its rays. The possibility of bomb attacks, however, led the National Radium Commission early last year to make recommendations for the safe keeping of radium in time of war by burying it at a depth greater than that of the maximum penetration possible by bombs. While these recommendations were accepted without question, Read has since contributed a review[1] underlining their necessity. He gives a useful list of papers dealing with radium poisoning, such as that arising in workers in the Schneeberg mines and in radium refineries, in luminous watch-dial painters, and in persons taking radium for

[1] *Brit. J. Radiol.*, 1939, **12**, 632.

"medicinal" reasons. Such radium as is retained in the body is largely stored in the bones, with a resulting aplastic anaemia, and the death has been recorded of a man who had accumulated as little as 1.2 μg. In addition to the anaemia, with its attendant ill-health and proneness to secondary infections, the storage of radium in the bones often leads to the development of osteogenic sarcoma; thus in a group of watch-dial workers, all those having a radium content of 4 μg. or more showed bone changes. The breathing of air containing radium dust is perhaps even more dangerous than its ingestion by mouth, and the death from carcinoma of the lung has been recorded of a worker in a radium workshop, the lung containing only a fraction of a microgramme of radium. The retention of inhaled dust in very low concentration approaches 100 per cent., and of this at least 5 per cent. becomes permanently fixed in the body. Thus the inhalation of as little as 50 μg. of radium is likely to prove fatal. Such concentrations can be detected by sensitive Geiger-counter equipment at several metres distance if only air intervenes, but if the radium were covered by two feet of earth it would escape detection. There can thus be little doubt of the wisdom of the precautions which have been taken, for, as Read remarks, "though we shall, no doubt, leave future generations to pay for the war, it would perhaps be a little unfair to poison them in addition." The desirability of leaving the radium buried even after the war is over may best be left to the decision of those competent to judge; at all events, many hospitals are already using their radium under conditions which ensure its safety should air raids occur.

CARBON MONOXIDE POISONING

At a time when everyone is familiar with a portable apparatus for protection against "gas" it is salutary to be reminded of a form of gas poisoning against which none of the three standard types of mask is of any value. Lieutenant-Colonel A. E. Richmond, in his recent review[1] of the subject of carbon monoxide poisoning, states that the toxic effects of this gas can be explained by its affinity for haemoglobin, an affinity which is even more dangerous at high altitudes or when strenuous exercise is being undertaken. The gas diffuses rapidly in the open, so that risk of poisoning only arises in enclosed or semi-enclosed spaces that have poor or have no ventilation. Moreover, high temperature and humidity with a given concentration of carbon monoxide cause rapid combination of the gas with haemoglobin. These points should be borne in mind in connexion with air raid shelters. Experiments have shown that an adult at rest will not complain of toxic symptoms until CO concentration in the blood has reached 20 per cent. This would be attained after about one and a quarter hours' exposure to a concentration of 0.05 per cent. in the air or in one minute with a concentration of 5 per cent. Exhaust gases from ordinary petrol engines are estimated to contain between 4 and 7 per cent. of CO, and defective exhaust pipes are therefore a source of danger to drivers or occupants of motor vehicles. Leaking stoves (coke and charcoal stoves in particular) may be responsible for carbon monoxide poisoning; Emile Zola was the victim of a faulty stove. Motorists are often being warned against allowing cars "to run" in small closed garages, but the fatal cases of carbon monoxide poisoning due to neglect of this warning may be explained by the widely held fallacy that there is no danger so long as the motor will operate. Actually, just as canaries and mice will succumb to concentrations of carbon monoxide which are not dangerous to man, so the human machine is wrecked by oxygen lack, in Haldane's striking phrase, some time before the ordinary motor-car engine refuses to function. Colonel Richmond describes a comparatively simple method of detecting carbon monoxide in the blood based upon the formation of a light carmine suspension when suspected blood is diluted with water treated with a solution of tannic and pyrogallic acids; with normal blood there is a light grey-brown suspension. A rough estimation of the percentage of CO in the blood can be made by matching the colours produced with a set of standards. For estimation of CO in the air he recommends as convenient and portable an apparatus based on the iodine pentoxide method. As regards treatment, the patient should be removed to the fresh air and artificial respiration by Schafer's method with certain modifications should be carried out. One of the patient's hands should be used to support the cheek and to keep the mouth off the ground; if possible the patient should be placed in a sloping position, 30 degrees with the horizontal, with the head low. Oxygen combined with 5 to 7 per cent. of carbon dioxide must be administered in all severe cases if life is to be maintained, and this may have to be continued for several hours. Warmth and absolute rest are essential, but drugs are of little value; caffeine, given intravenously, may improve the respiratory centre.

[1] *J. R.A.M.C.*, 1939, **73**, 79, 145.

PASSIVE IMMUNIZATION AGAINST INFLUENZA VIRUS

In the twenty-one years since the last pandemic of influenza much fresh knowledge has been gained of the part played by a virus in the causation of the disease and of the methods which must be applied if immunization is to be successfully carried out. It is doubtful, however, if even yet we are in a position to control a major epidemic such as that of 1918, when it is estimated that more than 9,000,000 persons died from influenza in a few months—a greater number than those killed by four years of war. Our lack of power to control a pandemic largely arises from the fact that hitherto efforts to produce active immunity in man against the influenza virus have not proved satisfactory, the degree of protection being less than that obtained against other virus infections of man and animals. In view of the possibility that history may once more repeat itself, it is desirable that investigations into all methods of inducing immunity to the influenza virus should be actively pursued. In this connexion the results recently obtained by Hare[1] in protecting mice against intranasal infection with influenza by previous intraperitoneal injection of serum from ferrets that had recovered from an attack of influenza are of considerable interest. When the ferret immune serum was injected thirty minutes before the nasal instillation of the infecting dose of virus the mice were almost completely protected against 10 M.L.D. of the virus, but the same dose of serum given twenty-four hours after injection with the same amount of virus protected only one-third of the mice. The immune serum prepared against one strain of the virus protected against heterologous strains or races of the influenza virus as well as against the homologous virus. An immune serum prepared against the influenza virus by injections into the horse, an animal not naturally susceptible to influenza, was not, however, nearly so active as convalescent ferret serum. If this method of passive immunization is ever to be used on a large scale in the control of influenzal outbreaks in man it is obvious that human influenza immune serum

[1] *J. Path. Bact.*, 1939, **49**, 411.

would be far preferable to that of lower animals, since, apart from the danger of serum reactions, heterologous is more rapidly excreted than homologous serum. Unfortunately the virus-neutralizing titre of human sera obtained after attacks of influenza is often low, so that pooled convalescent serum is not necessarily highly virucidal.

CEREBRAL DAMAGE IN HYPOGLYCAEMIA

Now that the later effects of insulin shock therapy are being seen psychiatrists are reporting cases of unexplained mental and physical deterioration following its use. It is, of course, usual to discover untoward sequels after the widespread employment of a new therapeutic method, sometimes due to the method itself and often to its injudicious administration. Many strikingly favourable reports have been made of the value of repeated hypoglycaemic coma and even convulsions in the treatment of schizophrenia and the cyclothymic disorders. A. B. Baker[1] has summarized the laboratory evidence that permanent damage may be done to cortical cells by repeated and prolonged hypoglycaemia—damage which would explain the physical and mental sequels described by the clinical workers. Yannet[2] suggests four possible mechanisms in the production of cerebral injury in hypoglycaemia: cerebral anoxaemia (especially when convulsions occur); cerebral anaemia associated with the hypothermia seen in insulin shock; a direct toxic effect of large doses of insulin; and simple cellular starvation due to the fall in available glucose. From the results of experiments on cats he considers the last two to be the causal factors. Biochemical changes after anoxaemia are similar to those found in hypoglycaemia; anoxaemia increases the incidence of hypoglycaemic convulsions; and Damashek and Myerson[3] have demonstrated an alteration in the oxygen consumption of the brain during profound hypoglycaemia, so that the conception that insulin shock therapy produces its therapeutic effects as well as cerebral damage indirectly through cerebral anoxaemia cannot be lightly dismissed. Further support for the view that anoxaemia is of first importance is given by Sahs and Alexander,[4] who found histological changes indistinguishable from those observed in fatal anoxaemia in the brain of a diabetic patient who had died after having been in hypoglycaemic coma for twenty-eight hours. The interpretation of the gross morbid changes seen in such a case is, of course, much more uncertain than the accurate observation of changes seen in controlled experiments on living animals. Yannet,[5] in another paper on the changes seen in cats during hypoglycaemia, reports a shift of water from the tissue spaces into the cerebral cells during hypoglycaemia. When the blood sugar rose many animals were normal, but some showed a state of decerebrate rigidity, with widespread degeneration of cerebral cells, like that seen in man by Sahs and Alexander. This was associated with a change in the sodium–potassium balance across the cell membrane and with a fall in the intracellular water. The biochemical changes in brain cells in hypoglycaemia are therefore profound and the processes involved are complex. The weight of evidence suggests that the direct action of insulin and the deprivation of glucose cause irreversible damage to the cerebral parenchyma, the end-result of which resembles that seen after fatal anoxaemia.

[1] *Amer. J. Psychiat.*, 1939, **96**, 109.
[2] *Arch. Neurol. Psychiat.*, Chicago, 1939, **42**, 395.
[3] Ibid., 1935, **33**, 1.
[4] Ibid., 1939, **42**, 286.
[5] Ibid., 237.

FOOD RATIONING: SPECIAL DIETS

The Medical Research Council has been requested by the Ministry of Food, the Ministry of Health, and the Department of Health for Scotland to appoint an expert committee "to advise from time to time on the question whether it is necessary on medical grounds to modify or supplement rations in the case of invalids and other persons on special diets," and the following have accepted the Council's invitation to serve: Sir Edward Mellanby (Chairman), Professor L. S. P. Davidson, University of Edinburgh, Viscount Dawson of Penn, Professor F. R. Fraser, British Postgraduate Medical School, London, Professor H. P. Himsworth, University College Hospital, London, Dr. R. D. Lawrence, King's College Hospital, London, Dr. R. A. McCance, University of Cambridge, Dr. J. C. Spence, Victoria Infirmary, Newcastle-upon-Tyne. The committee will hold its first meeting at once, when the question of diabetic diets will be particularly considered. The recommendations will be transmitted by the Medical Research Council to the Departments concerned.

REVISION OF THE PHARMACOPOEIA

The British Pharmacopoeia Commission has recently published two memoranda by two of its committees (pharmacy and pharmacognosy, and general chemistry), which are carrying out preparatory work for the next revision of the *Pharmacopoeia*. The reports deal chiefly with revisions of technical details regarding the pharmacognostic, chemical, and physical properties of drugs. These details are of great importance, because the whole value of the *Pharmacopoeia* depends upon their accuracy. Inspection of the reports provides an interesting indication of the extreme care and thoroughness with which the work of revision is being carried out. They are obtainable from the office of the General Medical Council, 44, Hallam Street, London, W.1. No. 13 (pharmacy and pharmacognosy) costs 2s. 6d. and No. 14 (general chemistry) 1s. 6d. Comments on them from readers will be carefully considered by the Commission.

THE HALF-YEARLY INDEXES

The usual half-yearly indexes to the *Journal* and to the *Supplement* have been prepared and will be ready soon. They will, however, not be issued with all copies of the *Journal*, but only to those readers who ask for them. Any member or subscriber who wishes to have one or both of the indexes can obtain what he wants, post free, by sending a postcard notifying his desire to the Accountant, British Medical Association House, Tavistock Square, W.C.1. Those wishing to receive the indexes regularly as published should intimate this.

The British Government has given the Red Cross and St. John official recognition for co-ordinating all voluntary offers of assistance throughout the Empire to sick and wounded combatants and civilians injured as a result of enemy action. General Viscount Gort, Commander-in-Chief of the B.E.F., has approved an order setting out the functions of the Red Cross in France. The French Red Cross is co-operating, and large storage space for supplies has been arranged.

[1] *Ann. Surg.*, 1939, **110**, 321.

SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

PENETRATING WOUNDS OF JOINTS*

BY

PHILIP H. MITCHINER, C.B.E., M.D., M.S., F.R.C.S.

One of the most anxious problems with which the practitioner has to deal is the diagnosis and treatment of the penetrating wound in the neighbourhood of a joint—usually the knee-joint. Such a wound may vary from that inflicted by a pin to a large lacerating wound freely opening the joint and involving serious damage to surrounding bones and soft parts. It is essential to realize that the pin-prick is as potentially dangerous in regard to life and limb as is the severe injury, and that both wounds need treating promptly on the same principle—namely, by excision of the wound track and resting the damaged joint in extension.

There is no doubt that the proper solution to the problem, and one which greatly simplifies it, is that in all wounds of this nature there should be complete and free excision of the track. This must be carefully and promptly carried out, for to be efficient in preventing sepsis it must be performed within twelve hours of infliction of the wound and must include all damaged tissues around the track throughout its entire depth. In the performance of this operation it can be definitely ascertained whether the joint cavity has been penetrated or not. Such an operation, however, requires general anaesthesia and removal to a medical institution equipped with an efficient modern operating theatre where asepsis can be ensured. Though this procedure is advisable and in the opinion of all surgeons of experience necessary, it often seems to the patient and his relations, and even in some cases to the practitioner, to be out of proportion to the apparent slightness of the injury, and for this reason the medical man is urged and may be tempted to adopt expectant treatment—a course that is all too frequently attended with disastrous results. Should, however, such expectant treatment be decided upon the limb must be placed at rest and extension provided to keep the joint surfaces apart, with a protective dressing over the wound. In order to secure adequate rest some form of skeleton splint—such as Thomas's—must be employed, while extension is to be applied by adhesive plaster in the manner subsequently to be described; but one would again emphasize that this treatment is not advised and is often fraught with danger and disaster to the unfortunate patient.

It must be realized that the presence of effusion in a joint in the neighbourhood of a wound does not of necessity imply that the joint cavity has been penetrated, as such an effusion may result from the trauma accompanying the injury; indeed, the presence of a large tense effusion is not compatible with a wound of any severity. It may be possible, by pressing on the swollen joint, to extrude blood or blood-stained synovial fluid from the joint cavity along the wound track, though failure to elicit this does not mean that the joint is not involved.

Treatment

In performing excision enough tissue must be removed to ensure that all crushed and damaged muscle is ablated, the guide to this being that muscle is a healthy colour and that it contracts, while the blood vessels will be found to spurt and not ooze. Care must of course be taken to preserve intact, or to repair if they are damaged, all important anatomical structures such as nerves and tendons in the track of the wound. Excision of the wound track is to be carried out in all cases, and if it is found that the synovial cavity has not been penetrated the tissues should be sutured layer by layer and the wound closed. It is advisable, even when the joint is not involved, to rest the limb by suitable splintage for twenty-four to forty-eight hours.

Wounds involving the Joint Cavity

Where the joint cavity is found to be involved and the synovial membrane penetrated, the edges of this membrane should be excised and the joint cavity inspected through the aperture so far as is possible. It cases in which no gross or extensive fouling of the joint has occurred it is not advisable to irrigate the cavity of the joint. The synovial membrane should be closed with a series of interrupted catgut sutures and the overlying tissues sutured in layers, drainage being left down to the joint cavity for twenty-four to thirty-six hours so that, should tension occur in the joint, effusion can escape, thus ensuring a free flow of fresh synovial fluid in the cavity.

Should the joint be grossly fouled, which is not likely except in lacerated wounds, or should there be gross bone damage into the joint cavity, the question of amputation will have to be considered, and this becomes imperative in all cases in which gross damage has occurred to the musculature or main blood supply of the limb. This is a serious decision, but it must be made promptly, and it is well for the practitioner to seek the advice of a colleague with considerable surgical experience. Should this not be possible it must be remembered that it is far safer for the patient, who may appear very fit apart from a rapid pulse, that the limb should be removed, as the appearance of wound shock in about twelve hours often leads to a fatal termination in those cases in which the limb has been preserved.

In less severe cases irrigation of the joint cavity with warm normal saline solution (sterile) must be carried out so as to cleanse the cavity thoroughly. Any loose fragments of bone or large foreign bodies must be removed and the synovial membrane closed in so far as this is possible without tension, any gap remaining being filled in with a graft of deep fascia.

Fixation and After-treatment

No matter what the condition, it is essential in every case that the joint be immobilized for at least three days subsequent to the operation, and, if the injury is at all severe, for a week to ten days. This immobility is best obtained by placing the limb in an extension splint of the Thomas type, in which it rests on a series of flannel slings. Extension is secured by applying strips of adhesive plaster to the shaven limb below the affected joint. The two strips are fastened round a wooden spreader and extension obtained either (*a*) of the fixed type, by the use of a Spanish windlass (Fig. 1), a method which must be employed in any case in which the patient may have to be

* Received for publication before the outbreak of war.

transported after operation, or (*b*) by weight extension taken over the end of the bed on a pulley, in which case a weight of approximately 1 lb. will be required for each stone of body weight.

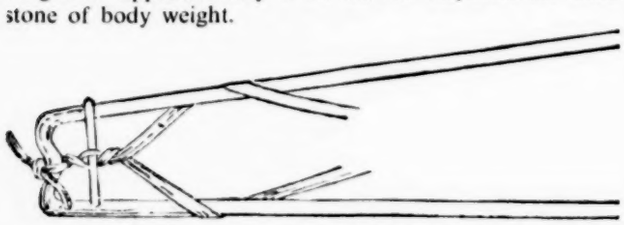


FIG. 1.—Spanish windlass for maintaining fixed extension when a Thomas splint is used.

Cases seen Late

After an interval of more than twelve hours excision is valueless as a means of combating infection, and in such cases all that can be done if there is a perforating wound is to place the limb in a suitable skeleton splint with extension and aspirate any effusion which may be present in the joint in sufficient quantity to cause tension or pain. Any such fluid withdrawn must of course be examined bacteriologically. If a lacerated wound is present all grossly damaged tissue must be removed and the wound dressed with 15 per cent. hypertonic saline, the limb being immobilized with splinting and extension as already indicated. In all such cases a careful watch must be kept for the onset of infection, the occurrence of which varies considerably in intensity both in relation to its local signs and in the severity of the general toxic effects. Should a cellulitis supervene or the joint fluid be found to contain streptococci, medication with sulphanilamide should be started immediately, best in the form of the oral administration of 1 gramme of prontosil album three times daily.

Joint Effusion

In the majority of cases in which the joint cavity has been penetrated, and, as has been stated previously, in many cases in which no penetration of the cavity has taken place, effusions of a greater or less extent occur within the first twenty-four hours, and, according to the tension in the joint, cause pain and even pyrexia. Where a tense effusion causes pain, or when doubt exists whether infection is present or not, the joint should be aspirated under all aseptic precautions. In the case of superficial joints, such as the knee, this operation may be performed under local anaesthesia; but with deeply placed joints, such as the shoulder or hip, general anaesthesia with gas and oxygen, if necessary supplemented by ether, is advisable. In every case the skin must be carefully cleaned with spirit and ether and a large-bore needle attached to a 10-c.cm. syringe be used to aspirate the joint. In most cases it is advisable to make a small incision through the skin, which can subsequently be closed by one suture, and insert the needle through this incision rather than puncture the skin with the needle direct, as thereby the chance of conveying infection into the deeper tissues is considerably minimized.

In the case of the knee-joint the outer side of the patella should be the point for aspiration, in the ankle-joint to the front of the internal malleolus, in the hip-joint to the outer side of the femoral vessels, in the wrist posteriorly in the joint line, in the elbow to the outer side of the olecranon process, and in the shoulder just anterior to the posterior deltoid edge; but the practitioner must use his own discretion in cases in which obvious effusion affords an easier line of approach to the joint cavity. The fluid withdrawn should be submitted to a bacteriologist for examination and culture, even if not turbid, and if the effusion reaccumulates to any extent further aspiration must be resorted to daily until the condition settles, which it usually does in from two to three days. Provided no gross infection is present the absorption after the first day or so may be aided by allowing the patient to move the joint gently under supervision.

In all such cases it is essential that fixation of the joint should be secured on the lines already indicated, and the extension and fixation should be maintained for at least three days after the disappearance of all obvious effusion from the joint cavity. It will of course be necessary to slacken extension in cases in which the fixed extension is used, in order to allow the patient to move the joint where such treatment is thought advisable; but where the weight extension has been used over a pulley it is advantageous to make the patient move the joint against this resistance.

Suppurative Arthritis

Should infection arise and progress in spite of this treatment a very serious condition of suppurative arthritis has to be faced, and again the practitioner will be called on to decide whether it may not be in the interests of the patient to consider prompt amputation. This in many cases is a life-saving operation, and, as already mentioned, should be performed immediately in all cases in which extensive bone damage involves the joint, and especially when soft tissues and blood vessels are extensively injured.

As I have said, it is advisable to seek a surgical opinion before arriving at a decision which involves grave responsibility. The absence of a pulse in the vessels either above or below the affected joint, the presence of grossly pulped and blackened muscle tissue in the wound and around it, and, of course, any appearance of gas in these tissues, as well as extensive bone damage which is involving both the joint and the wound, give clear indication that the limb must be sacrificed, and that promptly; while the presence of severe toxaemia combined with frank pus in the joint cavity is also an indication for prompt amputation. There are, however, a large number of cases in which the decision is very difficult to make, and in which delay will mean loss of the patient's life or, at best, the preservation of a useless limb that will subsequently need amputation after a long and painful convalescence which frequently leaves the patient a complete nervous wreck.

If it is decided to attempt to save the limb it is essential that efficient drainage of the joint cavity should be provided immediately, and in order to be efficient all drainage must be from the most dependent point of the joint cavity as the patient lies in bed. Inasmuch as the knee is the joint most commonly infected it is well to use this as an illustration and to point out that incision beside the patella cannot possibly drain the joint adequately. The only adequate incision for draining it is one made in the postero-lateral side of the limb between the ilio-tibial band in front and the biceps tendon behind, about half an inch above and in front of the head of the fibula (Fig. 2). When this incision has been made the joint cavity will drain freely, but it is wise approximately to close the synovial membrane with one or two sutures.

In the case of deeper joints incisions must be planned to approach the joint cavity without causing undue damage to superficial structures, while at the same time ensuring drainage from the most dependent point of the joint cavity in whatever position the patient may be nursed. Thus in the case of the hip-joint the posterior

approach is essential. In all cases the joint should be secured in a skeleton splint with extension in such a position that it will be useful to the patient should ankylosis result. This is a complication that is almost

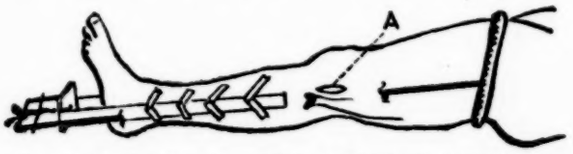


FIG. 2.—A, Incision for arthritis in front of biceps tendon. The figure also illustrates the method of applying adhesive plaster for fixed extension in a Thomas splint.

bound to follow suppuration in the joint cavity; but early active movements, once the acute stage of the infection is over, will do much to minimize the amount of adhesions formed and ensure a reasonably mobile joint, and the patient should be encouraged to make such movements two or three times a day soon after the establishment of efficient drainage.

In the case of deeper joints it is generally advisable to leave a drain down to the synovial membrane. In no case, however, must such a drain be placed within the joint cavity, otherwise dense bands of adhesions form around the track: these will produce marked limitation of the joint movement subsequently, as they cannot be broken down by manipulation without causing such a severe reaction that further adhesions will form before the patient can use the joint again.

It cannot, in conclusion, be emphasized too strongly that this risk of suppurative arthritis, with its extremely long and painful recovery and dire risks to the patient, can be avoided by early and proper excision of the wound track followed by rest of the joint, with extension and splintage. The practitioner is urged to realize this, and to advocate and carry out excision in all cases of wounds in the neighbourhood of joints, however trivial they may appear to be on first inspection.

The two figures above are reproduced from *Medical Organisation and Surgical Practice in Air Raids*, by Philip H. Mitchiner and E. M. Cowell, by kind permission of the publishers, Messrs. J. and A. Churchill.

Nova et Vetera

A HISTORY OF BACTERIOLOGY

Bacteriology. By William W. Ford, M.D., D.P.H. Clio Medica. (Pp. 208; eight illustrations; 2.50 dollars net.) New York and London: Paul B. Hoeber, Inc. 1939.

Attempts to popularize medical and scientific subjects vary as much in their mode of presentation as they do in the knowledge and ability of their authors. Some are so short and scrappy as to appeal to none but the most superficial of lay readers: others are so long and detailed as to repel all but the most serious-minded members of the professional classes. The present volume falls in between the two. It is a didactic account of the history of bacteriology from the earliest times to the present day, written by the late occupier of a well-known chair of bacteriology in a great American university. It discusses problems of classical importance, but it makes no great call on the reader's intelligence. In some respects it is elementary, yet it contains references to several hundred papers. Who will read it in this country it is difficult to say. Most doctors and medical students will find it too long, and few lay readers will find it sufficiently exciting. On the whole it will probably be welcomed mostly by teaching bacteriologists and postgraduate students as a means of amplifying the necessary shorter historical accounts in the textbooks and settling chronological and related questions. For both these purposes the double index of authors and subjects renders it particularly useful.

SOME OLD MEDICAL BOOKS

In spite of the war, Messrs. Davis and Orioli, of Museum Street, W.C.1, have enough faith in the allegiance of book collectors to their hobby to send out a catalogue of old medical books, including many scarce items. When the Doncaster yearling sales of blood stock are imminent it is the frequent practice of the racing correspondent of the *Times* to amuse himself and interest his readers by picking out the various young horses he would prefer to buy if he were a racehorse owner with a bottomless purse. On the same principle, the following are some of the books—not necessarily the rarest or the most expensive—which would most appeal to one doctor into whose hands this catalogue has fallen. There are, for instance, the first German edition of the eight books of Celsus, published by Schöffer at Mainz in 1531, stamped pigskin over oak boards; the *Rich Storehouse or Treasure* of popular medicine in black letter, not in the British Museum, first compiled by "G. W." and re-edited for the later edition now offered, of 1631, by "A. T."; the very rare first German edition of Vesalius's textbook of anatomy, published at Nuremberg in 1551 with forty plates. In another genre there is William Osler's first published work, a popular article in Hardwick's *Science Gossip* of 1869; some of us would rather have this comparatively inexpensive item than the ponderous tomes of the mediaeval authors. Smellie's set of Anatomical Tables, first edition, London, 1754, is another work not possessed by the British Museum: there is also a copy of the third edition, 1788, edited by A. Hamilton. Of great interest, too, is a tract championing Harvey's discovery of the circulation against certain detractors; this pamphlet has been hitherto unknown—it was published in a small town in Italy (Fermo) in 1680, and written by J. B. Scaramucci. Another rarity is the translation of Galen, published at Lyons in 1539, which is believed by the French experts to be from the pen of François Rabelais himself; this is naturally a somewhat expensive item. The last of the 678 items which space allows one to particularize is the volume by Thomas Willis, 1683, on *Two Disorders Concerning the Soul of Brutes*, of interest because in it he gives the first description of what has since been known as "paracusis Willisii," the condition in which certain deaf people can hear so long as a drum is being beaten in the vicinity.

MEDICAL EXPENSES IN THE 'EIGHTIES

There has lately fallen into the hands of a correspondent a set of domestic account books kept in beautiful script by a tuberculous clerk in Lincolnshire who was earning £2 a week in the early eighties of the last century. Every expenditure to the last penny is recorded. One entry in 1883 reads: "Paid Dr. P. (wife's confinement) £1 7s. 6d." In 1884: "Paid Dr. P. (wife's eyes) 17s. 6d." In 1885: "Paid Dr. P. for attending me, January, 1884, £2 16s. 0d." Then comes a consultation costing three guineas, but two of the three are spent on travel: "Expenses to London to see Dr. Williams, railway fare 35s. 7d., cabs 4s. 6d., doctor 21s.; sundries 1s. 11d." In June, 1886: "Paid Dr. P. for attending me during 1885, £7 12s. 6d.," and again in 1886: "Dr. Lambert for bacteria remedies and commission, £2 2s. 4d." The amounts spent on medicines by this little family are interesting. In 1880 the sum of 6s. 6d. was spent on the following: "Black beer, castor oil, cough mixture, glycerine, horehound, infant's preservative, lime water, sweet nitre." Other drugs in subsequent years include balsam of aniseed, tincture of rhubarb, gripe mixture, Kayne's linseed, olive oil, peppermint, Spanish juice, pills, senna, and magnesia. The biggest entry is: "Congreve, balsamic elixir, 24s. 9d., and commission on order, 3d." The neat hand falters and the entries cease in 1886.

COMMITTEE ON WAR-TIME PROBLEMS OF NUTRITION

The following have accepted membership of the Committee on War-time Problems of Nutrition appointed by the British Medical Association:

Professor V. H. MOTTRAM, M.A.,
Professor of Physiology in the University of London, King's College of Household and Social Science.

Professor E. P. CATHCART, C.B.E., M.D., F.R.S.,
Regius Professor of Physiology, Glasgow University.

Professor S. J. COWELL, F.R.C.P.,
Professor of Dietetics in the University of London.

Dr. J. H. HARLEY WILLIAMS,
National Association for the Prevention of Tuberculosis; Central Council for Health Education.

Dr. MAITLAND RADFORD,
Medical Officer of Health for St. Pancras; Central Council for Health Education.

Sir KAYE LE FLEMING,
Late Chairman of Council, B.M.A.; General practitioner in Wimborne.

Dr. WILFRED J. PEARSON, D.S.O., *M.C.*, F.R.C.P.,
Children's Diseases—Physician-in-charge, Children's Department, University College Hospital; Physician, Hospital for Sick Children, Great Ormond Street.

Dr. J. C. SPENCE, *M.C.*, F.R.C.P.,
Physician, Newcastle.

Reports of Societies

ELECTRICALLY INDUCED CONVULSIONS

At a meeting of the Section of Psychiatry of the Royal Society of Medicine on January 9, Dr. F. GOLLA presiding, two communications were presented on "Electrically Induced Convulsions." The first was by Dr. Golla, Dr. W. Grey Walter, and Dr. G. W. T. H. Fleming of the Burden Neurological Research Institute, Bristol, and the other was by Dr. W. H. Shepley and Dr. J. S. McGregor of Warlingham Park Hospital. The latter communication repeated in part the technical descriptions which appeared in the paper by the same authors in the *British Medical Journal*, December 30, 1939 (p. 1269).

Technical Aspects

Dr. GREY WALTER said that it was fitting that the originators of this method, Cerletti and his assistant Bini, should be countrymen of the great Galvani, the father of electrophysiology, because they shared not only his originality and insight but also his daring. The difficulty of the procedure was apparent when the conditions which must be fulfilled to stimulate the brain through the skull were considered. In operations in which the skull was opened and the brain exposed the electrical current necessary to evoke a maximal response was usually of the order of milliamperes. The effect of passage through the skull and other tissues was greatly to attenuate the potential in the cortex, so that if a current of 5 to 10 milliamperes were needed to evoke a response from the exposed brain, something like one hundred times that amount of current would have to be applied through the scalp, and in some cases as much as one ampere might be necessary—a formidable proceeding. It spoke highly for the courage of Cerletti and Bini that they had dared to apply this large potential to the outside of the head.

The potential and current relationships which obtained with any organic tissue were by no means straightforward. The classic Ohm's law relationship (that the current equals the potential divided by the resistance) did not hold. The effect of the current upon the organic tissues was to change the resistance, and the number of volts needed to produce a stimulus could not be immediately inferred. Other variables came in, such as frequency, wave-form, and duration. Cerletti and Bini had used the ordinary 50-cycle alternating current from the mains, which apparently gave a quite adequate stimulus; the optimal stimulus was not known, nor was much known as to the requirements for stimulating the cortex. If it was assumed that the same conditions held for electrical shock as for electro-encephalography, then these high currents were attenuated sufficiently to keep them below traumatic pressure. The current which started from the electrode placed on the scalp would spread out over the cortex, so that, supposing the electrode to be 20 sq. cm., an area of cortex of perhaps 200 sq. cm. would be stimulated. The effect of attenuation was brought about not by resistance drop but by spread. With a large padded electrode the current density, though high enough, was not unduly high at the point of entry, and there was evidence after electrically induced convulsions that the current spread was considerable. A great deal had still to be learned about appropriate electrode size and position and the effects on different parts of the brain and their significance. In the work at Bristol alternating current from the mains had been used, with a duration of 0.1 or 0.2 second. It had been found that for some patients the duration must be longer, even up to one-third of a second, to evoke a fit. For convenience the use of sinusoidal 50-cycle current was recommended, though it was by no means certain that it was the best for the purpose.

The first physical effect of the stimuli was to lower the resistance. If 1,000 ohms resistance was taken before the application the drop was very large, almost 50 per cent., and the recovery correspondingly slow and not complete for about ten minutes. A medium resistance caused a less considerable drop and the recovery was more rapid, and with a low resistance the drop was slight and recovery took place within a minute or two. It was important to remember that a second stimulus of the same size as the first would produce a larger current. Attempts had been made to obtain electro-encephalograms at all stages of the procedure, but to get the record during the first few seconds after 100 volts or so had been applied was impossible without very special instruments. The most that could be done was to get a record beginning about four or five seconds after the administration of the shock. Experiments were in progress to determine the effect of using currents mimicking those produced by the brain during a spontaneous fit. It had been found that the latency of the fit could be prolonged by placing the electrodes as far forward as possible and giving a threshold convulsant dose. Latencies as long as 30 seconds had been observed, and during this time the patient was unconscious.

Dr. Grey Walter concluded by showing a cinematograph film of the application of the treatment to a woman with a two-years history of schizophrenia. The electrodes were secured to the head with rubber straps and the patient was induced to bite on a gag. Immediately on the application of the current the patient became unconscious, and the fit followed within a few seconds. Five minutes later the patient was conscious and flaccid, and after ten minutes she was able to get up and walk, and stupor had given place to a mild confusion. Parts of the film were shown in slow motion to illustrate how in the clonic stage all the muscles contracted together and then relaxed.

Physiological Considerations

Dr. G. W. T. H. FLEMING added some further description of this work from the clinical side. He said that at first sight electrically induced convulsions appeared to resemble an attack of idiopathic epilepsy, but there was one important difference, the shock being followed by an immediate start or convulsive movement of all four extremities. It was only after this initial start that the tonic followed by the clonic discharges became evident. The initial start had a latent period of certainly less than 0.1 second. There was every reason to assume that the start was due to the direct stimulation of the motor cortex by the exciting current. In cardiazol-produced fits, instead of a single initial starting convulsion a series of separate discharges took place, from one to ten separate convulsions. The discharges in the electrically induced convulsions were of far less intensity than those evoked by cardiazol therapy. The greatest objection to cardiazol therapy was the latent period between the injection and the evocation of the fit, during which time the patient

experienced an emotional condition of intense terror. The electrically induced fit, on the other hand, brought a complete amnesia regarding any events from the moment when the shock was administered until the end of the fit. The current used, in view of its strength, would no doubt be extremely painful were it not that the cerebrum appeared to be completely "knocked out" before integration of the painful stimulus could be effected. In many cases the amnesia covered the whole period of adjusting the electrodes; in others it was practically coterminous with the shock. The patient never had any knowledge of the fit itself. For this reason patients were not likely to refuse treatment. Again, the intense clonus of the cardiazol patient was never observed. The feature common to both the induction methods was the initial start reaction, and it was this which constituted the drawback of both.

Compression fractures of the vertebrae were practically unknown in idiopathic epilepsy, but they were frequent with cardiazol treatment, and they had been encountered in electrically produced fits. It was probable that this accident had been exceedingly frequent in cardiazol treatment, inasmuch as it was only in those hospitals where the patients were systematically *x*-rayed that the fractures had been found. Such fractures might be apparent to the patient only as pain of no great intensity in the back, and no more might be heard about them. As to whether this liability to spinal lesion constituted a contraindication to the use of the treatment nothing much could be said at present, but if convulsive therapy proved itself of real value as a curative agent it would not be justifiable to discard it on account of certain non-lethal dangers.

Of curative effects he preferred to say nothing at the moment. Just as with cardiazol, some marvellous recoveries had been observed, such as the clinician would attribute only to the treatment itself, but the time had not yet arrived for any assessment of value. One remark must be made as to post-epileptic behaviour. Every patient had his own stereotyped manner of behaviour in the post-epileptic stage. Some indulged in rhythmic movements, some always repeated the same utterances, some became aggressive, others turned over and went to sleep. In each case the particular type of post-epileptic conduct remained constant until general clinical improvement became manifest.

Further Clinical Experience

Dr. W. H. SHEPLEY said that the time during which the current was allowed to flow was more important in the induction of the fit than the voltage. Frequently it had been possible to obtain a major fit by increasing the time when an increase in voltage had proved ineffectual. Nevertheless, fits might be induced either by a high voltage for a short time or by a low voltage for a longer time. The voltage ordinarily used ranged from 100 to 120, and the time 0.2 second. At the moment of passage of the current the heart stopped, but the exact duration of stoppage could not be ascertained because of movement of the patient and the impossibility of a cardiographic record. In insulin coma, when several shocks had been given without induction of a major fit, there was a tendency for the patient to come out of coma.

This treatment had been applied to fifty patients, six of whom were in insulin coma when treated, and 200 fits had been produced, some patients having had as many as twelve over six weeks. The cases included those of schizophrenia, paraphrenia, agitated melancholia, recurrent mania, and hysteria, many of them of long standing. Some which had remained well on a maintenance (once-fortnightly) dose of cardiazol showed the same response to electrical convulsive therapy. The advantages were the removal of the anticipatory fear and the absence of after-symptoms, such as vomiting, confusion, and excitement, which in other forms of therapy required confinement to bed and nursing attention.

Speaking of shock therapy in general, on the basis of an experience of 250 cases treated with cardiazol and fifty electrically treated, Dr. Shepley and Dr. McGregor said that many shock-resistant cases were true indigenous schizophrenics, well termed dementia praecox by the older clinicians. A further resistant group was the class of patient with fixed delusions. Cases favourably influenced were those of stupor, both depressive and catatonic, and the wider group of schizoid-depressives. In the 200 electrically induced fits no fracture or dislocation had so far been recorded. Administratively the electrical method had advantages in economy and lessened nursing attention and supervision.

Latest Italian Observations

Dr. L. KALINOWSKY quoted from a report which Professor Cerletti had sent to him on two years' work at his clinic in Rome. The time of observation was too short for a considered judgment. Immediate results in more than 100 patients showed that where the duration of the psychosis had been shorter than six months recovery was obtained in nearly 80 per cent. of cases, and the remainder were improved. The proportion of complete recoveries decreased with the previous duration of the disease, and in cases of from one to three years' duration only one-third showed recovery or much improvement. The optimal effect in the cases of short duration was obtained on the average after fifteen complete and four incomplete fits. Dr. Kalinowsky himself had not seen any striking difference in quality of results between the various groups of schizophrenia. The most surprising reactions had been in the depressive group of manic-depressive psychoses, and Cerletti now regarded his results in these cases as being more satisfactory than in schizophrenia. He thought that electrical convulsion treatment had proved its harmlessness by the fact that in Italy, where the method was already used in all mental institutions, an enormous number of fits had been produced without any accident. Fractures and dislocations had never occurred. Cerletti and Bini had an apparatus which could be employed with absolute reliability by any doctor in a mental institution although he had no special knowledge of electrophysiology. In order to produce the fit with minimum voltage an electrode had been made which enabled a very strong local pressure to be applied without inconvenience for the patient. In this way a low resistance was obtained, and fits were induced with an average of 80 to 100 volts with a time setting of 0.1 second. This short time limit was recommended by Cerletti because animals could stand extremely high voltage but were endangered after a very long time of passage of the current, owing to the lengthened tetanic state of the respiratory muscles. It was owing to these technical precautions that the method was proving its harmlessness and seemed likely to mark distinct progress in shock therapy.

Dr. DONALD BLAIR took up Dr. Fleming's point that the various movements seen in the fit were always the same for each individual. The same thing occurred in cardiazol treatment. Not only after the fit, but from the moment of injection and in the cases in which a fit did not follow, the same reactions took place in the individual. Some remained quiet, others made chewing movements, others showed twitching movements or other psychomotor excitement, but the reactions in the individual patient were always of the same character. These reactions did not change beneficially as the result of treatment; they remained the same whatever happened. It had been suggested that some of these might be correlated with different types of psychosis, but in his experience no such correlation was possible. It was disappointing to learn that fractures occurred in electrically induced convulsions. In the cases first treated by cardiazol it was supposed that no fracture of the vertebrae occurred, but afterwards it was discovered that there were quite a number of such fractures. He had seen four fractures of the femur in cases treated with cardiazol.

A Sceptical View

Dr. C. R. BIRNIE objected to the use of the term "therapy" in this connexion. It was an interesting piece of research, but results were not yet available to justify the term "therapy." On an earlier occasion in the same Section, when the subject of cardiazol therapy was brought forward amid a burst of unscientific enthusiasm, he was one of the few who had sounded a note of warning. The warning had been justified

by the recent very careful work done on this subject in America, where large numbers of cases had been considered by an expert committee from the point of view of recovery, and the conclusion was reached that the results of treatment were no better than the normal remission rate. This was what as psychiatrists they might expect. The psychoses which they tried to treat were complicated by the reactions of the personality to the environment. They probably represented the attempt of a failing organism to make an adaptation which must be imperfect. The inhibitions which were observed in many types of schizophrenia, the stupor and depression, were attempts on the part of Nature to repress certain unconscious urges with which consciousness was unable to deal. The convulsive treatment was releasing these unconscious urges and allowing them to flood the consciousness, and the result to be anticipated was that, as the consciousness had not been able to deal with them before, it would be no better able to deal with them as the result of shock therapy. He urged that before electrical apparatus was introduced on a large scale into mental hospitals for this purpose more accurate information should be obtained as to results of treatment and in particular whether what was termed a remission was in fact a complete remission. He had undertaken intelligence tests on patients who were described as cured by these methods, and although his work was by no means complete he was convinced that the criteria of remission needed to be much more strict. Finally he remarked: "Our patients seem to be in danger of having a very thin time. First we cardiazolize them, then we insulinate them, and now we are proceeding to electrocute them. Let us exercise a little more prudence before we accept these latest forms of therapy as panaceas for all the psychoses."

Dr. GREY WALTER, in answer to Dr. Isabel Wilson, said that the electrodes used in the work he had described were only about one-quarter of the size of those which Dr. Shepley and Dr. McGregor had exhibited (illustrated in the plate facing page 1284 in the *Journal* of December 30), and they were always placed as far forward as possible with a view to avoiding deeper structures in the current flow.

BRITISH ORTHOPAEDIC ASSOCIATION: ANNUAL MEETING

The British Orthopaedic Association held its annual meeting in London on December 8. Owing to the recent death of the President, Mr. Naughton Dunn, the meeting was conducted by the Vice-President and President-elect, Professor T. P. MCMURRAY, who opened the session with a warm tribute to the late Mr. Dunn.

During the proceedings the annual general meeting of members was held, new officers were elected, and a scheme was approved for the continuance of bi-annual meetings at readily accessible centres during the war.

Treatment of Compound Fractures

Dr. J. TRUETA outlined the treatment which he had found highly successful in over one thousand compound fractures produced by aerial bombs during the Spanish Civil War. He emphasized the necessity for the speedy transfer of casualties to hospital and for their proper segregation by experts on arrival. For the prevention and combating of sepsis the following technique was found to be of the greatest value: (1) careful excision of all damaged tissues, and particularly muscle, preferably within two hours of the injury; (2) adequate drainage of all cavities by sterile absorbent gauze; and (3) rigorous immobilization secured in most injuries by plaster-of-Paris applied directly on the skin without padding and without a window over the wound. The only exception to the use of plaster-of-Paris was in those patients in whom there was doubt about the vitality of the tissues remaining after excision, or doubt about the total circulation of the limb. Gas gangrene had occurred in only one patient, and in only eight had the plaster to be removed because of cellulitis in the region of the wound. These complications could be recognized immediately by changes in the comfort of the limb and in the general condition of the patient, and in Dr. Trueta's view were not obscured from the expert surgeon by the plaster-of-Paris splint.

Sacro-iliac Tuberculosis

Mr. H. J. SEDDON read a paper on 176 cases of tuberculous disease of the sacro-iliac joint, collected from various open-air hospitals throughout England. The condition was, he said, a disease chiefly of young adults. There were three distinct clinical types: (*a*) an isolated closed lesion with a mortality rate over a six-year period of 10 per cent.; (*b*) an isolated lesion with sinuses—mortality rate over a six-year period of 25 per cent.; and (*c*) a lesion with or without sinuses but accompanied by a lesion elsewhere in the body—mortality rate over a six-year period of 55 per cent. Abscess formation was very frequent. Bony ankylosis appeared to be the usual end-result of conservative treatment even in the absence of secondary infection. Fusion of the joint by operation might be beneficial, but the merits of this procedure had not yet been clearly demonstrated. Recovery generally meant that the patient would be able to return to full work, and relapse was very rare; some chronic invalidism was due to sinuses. Pregnancy did not cause relapse of the disease.

Trauma to the Knee-joint

Mr. A. O. PARKER, in a communication on fractures of the external tuberosity of the tibia, expressed disappointment with the result of conservative treatment, and tentatively suggested that in certain of these fractures a better reconstruction of the damaged articular plateau could be obtained by an open operation. From a limited experience he felt that the external semilunar cartilage torn from its peripheral or central attachments presented an obstacle to successful conservative reduction of the fracture more often than was realized.

Amputations

Mr. P. JENNER VERRALL gave most instructive information about amputations gained from his long experience at Queen Mary's Hospital for the Limbless, Roehampton. It is impossible to do justice to Mr. Verrall's comprehensive and detailed survey of every step in operative technique and in the fitting of artificial limbs. Of his many useful hints perhaps the one least commonly known was that nerves should never be crushed, ligatured, pulled down and cut short, or injected with alcohol. A plea was made for conservatism in the treatment of painful stumps, which are most efficiently dealt with by expert limb fitting, by anodal galvanism, and by the development of an occupational interest.

Irradiation of Primary Bone Tumours

Mr. K. I. NISSEN gave a careful survey of ninety cases treated at the Westminster Hospital Radium Annexe during the past eight years. Many of them were inoperable and irradiation was the only possible form of treatment. Implantation of radium needles or seeds was condemned and was not used in this series. External irradiation by deep *x* rays or by radium bomb was vastly superior, for it had the advantage of accurate dosage and control of direction without trauma to the tumour. In tumours with a bulky stroma and relatively poor vascularity—for example, chondrosarcoma—irradiation was of little use and the value of amputation or excision was undisputed. In highly malignant and vascular osteogenic sarcoma metastases occurred so early that death was inevitable whatever the treatment employed. The best that irradiation could do was to retain a painless and useful limb for the remainder of the patient's life. In less malignant sarcomata high dosage was necessary, and local recurrences took place about one year after the beginning of treatment. Further irradiation might control spiculated periosteal growth, but medullary extensions were most intractable. In Ewing's tumour irradiation produced rapid resolution, which could be maintained until death. Osteoclastomata of the extremities were best treated surgically, but large tumours of the trunk bones, which were grave surgical problems because of haemorrhage, sepsis, and incomplete removals with recurrence, often responded very well, after a transient increase in symptoms, to small doses of irradiation.

Correspondence

Plethora of Medical Students

SIR,—Many of your readers must have seen the correspondence in the *Times* under the title "16 to 20," which refers to the special difficulties created to-day for boys who have time to fill in between leaving school and entering the Services. The study of medicine, with the prospect of six years of security, has become unusually attractive, and the universities and colleges should put their heads together as soon as possible to prevent overcrowding.—I am, etc.,

Oxford, Jan. 12. L. J. WITTS.

Penetrating Chest Wounds

SIR,—It is a well-known and accepted fact that in 1914-18 surgeons in casualty clearing stations in France had to learn their jobs from very bitter experience. Had they been able to apply in 1914 and 1915 the knowledge they had gained by 1918 there would have been an appreciably smaller number of graves in France.

It would be more than tragic if the clearing station surgeons of this war did not begin where we left off, and that time and life should be wasted in relearning that in many of the problems with which they will be faced peace-time surgical principles and technique fail sadly. That is my sole reason for joining issue very definitely with one paragraph of Dr. F. G. Thomson's article on chest wounds (*Journal*, January 13, p. 44). The greater part of his article would, I think, be accepted without controversy, and no departure from peace-time principles is necessary in connexion with the cases in this part. The paragraph headed "Early Closure of Penetrating Chest Wounds" is the trouble. I suggest that his conclusion that this is a doubtful procedure is based on totally inadequate evidence. It is utterly fallacious to compare the mortality rate in this group of cases with the mortality rate in those cases in which there was no, or only the most conservative, primary surgical intervention. He completely ignores the following essential factors: (*a*) the type of injury in which closure procedures were adopted; (*b*) what the mortality was in these cases before the adoption of closure—this is a C.C.S. mortality rate, for few of them ever reached a base hospital. Complete excision of the chest wall wound, cleansing of the pleural cavity, if necessary partial lobectomy and primary suture, were almost entirely reserved for those cases which already had large sucking wounds when they reached the C.C.S. I could have given the mortality figures for one C.C.S. prior to April 9, 1918, but that day Jerry rendered my notes no longer available. Unfortunately, my memory has reason to be still very clear on the question—we buried most of the men. The obvious criticism is, Why on earth was closure not adopted long before 1917? There is an answer, but it has more to do with the haemolytic streptococcus than the anaerobes; but that is another story.

Surgery in the last war was divided into three watertight compartments: casualty clearing station; base hospital in France; hospital at home. Largely through ignorance of the differing problems we all heartily cursed each other. There should be no consulting surgeon or consulting physician in France this time who is not fitted from personal experience, and I might add personality, to be the complete liaison officer between all compartments. Our difficulties last time would have been immeasurably greater had it not been for the tireless work of a few outstanding consultants. Their help is still a vivid memory.

Reading Dr. Thomson's paper makes one wish that Professor Gask would complete the picture with an account of his work on chests at Rémy Siding.—I am, etc.,

Truro, Jan. 13. J. H. HOOD.

SIR,—I note that Dr. F. G. Thomson in his valuable article on penetrating wounds of the chest in your issue of January 13 makes no mention of the use of iodoform for infected or inflamed pleura. As far back as 1889 I saw a case of drained empyema treated with iodoform with completely satisfactory result.—I am, etc.,

London, N.W.3, Jan. 15. J. BARCROFT ANDERSON.

Treatment of Gas Gangrene

SIR,—May I congratulate Mr. W. A. Cochrane for his letter in your issue of November 11, 1939 (p. 973), in which he draws attention to the work of Kelly and Dowell on the treatment of gas gangrene by *x* rays. It is unfortunate that in his letter he gives the impression that this method is still in the experimental stage and is not so important as the accepted methods, which are based on wide surgical mutilation.

Kelly has been treating gas gangrene with *x* rays since 1928, and has regularly published his results. Far from being just another method of treatment, his procedure is the only one that has reduced the mortality of gas gangrene to below 10 per cent. He has also proved conclusively that therapeutic amputation and mutilative surgery are useless as therapeutic measures. The present position is concisely summarized in an article by Kelly and Dowell in the *Archives of Physical Therapy*, February, 1939. This article is the summary of the work of a hundred men scattered through the United States, and embraces 143 cases. Further information will be available on the publication of the proceedings of the Radiological Conference held at Denver, Colorado, at the end of July last. At the conference Kelly was one of the guest speakers. His subject was "The Radiation Therapy of Inflammations." The interest shown in the United States in this method of treatment is in sharp contrast to the apparent apathy in Great Britain. Apart from W. A. Cochrane's letter I have been able to find only one other reference in English literature—a letter published in your columns some months ago. The *British Journal of Radiology* has been quite silent on the matter.

My own experience of the method is based on a small series of five cases treated during the past two years at the Perth Hospital. Three of these patients were passed to me as being too ill for any further surgical intervention. One patient was moribund and subsequently died. The other four patients lived. In three of these cases serum and prontosil had been administered. A mobile *x*-ray machine of very moderate output was used to give the treatments. My own conviction is that *x*-ray therapy is the first line of attack in the treatment of gas gangrene. Mobile machines are now procurable of sufficient capacity to treat any type of lesion quickly and thoroughly. These machines should be part of the equipment of all casualty clearing stations and hospitals on lines of communication. My earnest hope is that *x*-ray therapy will be quickly introduced, and that the mutilation that we saw in the casualty clearing stations during the last war will not be seen during this conflict.—I am, etc.,

Perth, Western Australia, Dec 21, 1939. WM. H. GODBY, Honorary Radiologist, Perth Hospital.

Endotracheal Anaesthesia

SIR,—While thanking Sir Harold Gillies and his colleagues for their courteous letter (*Journal*, January 13, p. 69), I would crave a little space to answer their criticisms of my communication in your issue for January 6. Perhaps it will save space if I denote the modern method of inhalation by the letters M.M. and the original intratracheal insufflation, or pressure method, by the letters I.I.

To take Sir Harold Gillies's advantages of the M.M. seriatim:

1. "*The M.M. is physiological.*"—I submit that the I.I. is just as physiological. There is much less interference with the glottis; the actual respiratory movements are much quieter—a great advantage in operations, not only on the chest but also in the upper abdomen.

1a. "*In the M.M. the right heart is not subjected to stress, as is likely to happen in I.I.*"—If my critics will open both sides of the thorax in an anaesthetized cat they will soon see

the effect of an incorrectly sized intratracheal tube on the right side of the heart. Distension of the right auricle only occurs with too large or too small a tube. If by stress on the right side of the heart asphyxia is meant, then I may state clearly that this is a myth in the I.I. method. Not only does it help the patient's breathing, but in cases of necessity it is just as effective a respiratory machine as an iron lung.

2. *The trachea is protected [in M.M.] from the entry of blood by a pharyngeal pack or inflatable cuff.*"—I thought I had made it sufficiently clear by the charcoal experiment that the I.I. method is superior in this respect.

3. "*The patient has the minimum of ether administered.*"—One of the charms of the I.I. is that, per unit of time, the amount of ether absorbed is exactly equal to that eliminated. Once the machine is set the desired depth of anaesthesia may be kept level for hours. The amount of ether used may be greater, but the amount absorbed by the patient is always minimal.

4. "*In oral operations the surgeon is not embarrassed by anaesthetic apparatus.*"—Here also the M.M. can claim no advantage. In I.I. the apparatus could be placed in the next room without any loss of efficiency.

5. "*If the nasal route is used the introduction of the special catheter is readily done after a moderate degree of practice.*"—A few days ago a surgeon friend told me that he had to wait impatiently for twenty minutes watching his anaesthetist trying to pass a nasal tube. How much easier to see what you are doing with a laryngoscope! And which method is really more likely to blow up the stomach—one passed blindly or one seen to enter the trachea?

6. "*And last, but not least, the operator is saved from the constant reverse blast of the second-hand ether. . . .*"—I have not found this a valid objection, though I admit that blood may sometimes be annoying in mouth operations. On the other hand, my E.N.T. friends in tonsil enucleation find it a boon. But if the smell of the returning ether is objectionable I would ask the surgeon to use gas-and-oxygen by insufflation. It works just as well.

The argument I advanced in the *Journal* of January 6, and which I would reiterate, is that the I.I. method is not only a method of anaesthesia but a method of respiration as well. If in the so-called improvements the anaesthetist neglects this aspect of the problem he is throwing away the essential physiological feature of the method.—I am, etc.,

Liverpool, Jan. 15. R. E. KELLY.

Gas Injuries to the Eye

SIR,—Dr. M. Lichtenstein in his letter on the above subject in the *Journal* of December 30, 1939 (p. 1295), suggests as routine treatment for mustard-gas contaminations that the eye should be flushed with liquid paraffin. The reason he gives for adopting this line of treatment is that as mustard gas readily dissolves in liquid paraffin it will wash away all the poison from the conjunctival sac. Dr. Lichtenstein has been misinformed with regard to the solubility of mustard gas in liquid paraffin. Its solubility is less than 1 per cent. Prentiss in his book *Chemicals in War* (1937) points out that, while mustard gas is rapidly dissolved by the light paraffin hydrocarbons, it is, however, soluble with difficulty in the heavier hydrocarbons of the same series, such as liquid paraffin. Liquid paraffin would not, therefore, appear to have any advantage over plain water, and there appears to be no reason to depart from the treatment recommended in the official publications.

A volume of correspondence on the subject of chemical warfare injuries to the eye has appeared recently, much of it by persons with no practical experience of this type of injury. In view of this it would perhaps be wiser if suggested lines of treatment were first submitted to competent experimental investigation before dogmatic statements are made on their value. In this connexion it may be of interest to state that various treatments that have appeared in the correspondence columns of this *Journal* and elsewhere have been subjected to carefully controlled investigation. Many of them have been found to be not only valueless but also actually harmful. It is most unwise that published statements on treatment should appear before definite experimental evidence is available of their value. If any treatment is shown by experimental investigation to be of greater value than that which has already been recommended, it will be published as an amendment to the official publications.—I am, etc.,

War Office, Jan. 12. L. T. POOLE.

Treatment of Fractured Femur at the Site of the Casualty

SIR,—I wish to utter a warning against the treatment of fractured femur at the site of the casualty as advocated by Dr. F. B. Chavasse (*Journal*, January 6, p. 25).

In the summer of 1917, while attached to an infantry battalion, I worked out a treatment for this injury identical in principle to that advocated by Dr. Chavasse, and I trained the regimental stretcher-bearers in its use. In September, 1917, I discontinued its use after having seen a case so treated being carried from the line. On that occasion I saw the sagging and springing of the stretcher poles as the party was outlined against the sky, and realized that the extension on the limb was being relaxed and tightened with almost every step taken by the bearers.—I am, etc.,

Lee, S.E.13, Jan. 6. W. E. HALLINAN.

Administration of A.R.P. Casualty Services

SIR,—I believe there is general agreement in the profession with the view of Dr. John Scully (*Journal*, December 30, 1939, p. 1295) that doctors should not move with first-aid (London region "stretcher") parties, but wait for the cases to reach first-aid posts and hospitals. This would appear also to be the official view. If considerable air raids occur there will not, of course, be enough doctors to go to nearly all the scenes of damage; but A.R.P. first-aid parties, even if keen and well trained, are mostly "unblooded," and I believe the presence at a major catastrophe of a doctor (preferably with at least elementary knowledge of A.R.P. organization) will result in considerable saving of life.

A large number of general practitioners are allocated as first-aid post medical officers or reserves already; I would suggest that many more might be informally attached to the A.R.P. depots in the London region, so that the men would know them and subsequently have the value of their experience and leadership in air raids. It is obvious that in most cases a general practitioner at present unallocated to precise duties in air raids would go to the scene of a large H.E. bomb in his own area; his potential usefulness would be very much greater if the A.R.P. personnel already knew him.—I am, etc.,

E. B. GROGONO, M.B.,
Woodford Green, Jan. 4. First Aid Commandant.

Enuresis

SIR,—I find much to disagree with in Dr. Doris M. Odlum's article on nocturnal enuresis in the *Journal* of January 6 (p. 8). Part of my disagreement is based on the assumption that the regime described in the section on treatment of nocturnal enuresis not due to gross physical causes is recommended by her for children of normal intelligence who habitually wet their beds during sleep. My subsequent remarks are chiefly concerned with these cases.

I believe that the child wets his bed because he relaxes his sphincter vesicae during sleep, not because he has a full bladder. When cured promptly by suggestion, as he should be, he can have a drink of tea before going to bed if he likes and lie with a full bladder all night without wetting, thus proving this point. The regime compiled by Dr. Odlum, on the other hand, erroneously teaches the child by suggestion that he should keep his bladder empty, that he cannot keep a dry bed with a full one, and that therefore he is not like other little boys; thus a fallacy is perpetuated.

In contrast to Dr. Odlum's treatment, I say: Teach the child by suggestion to keep his sphincter closed during sleep and it does not matter about the bedclothes or the nightgarments. Put the chamber under the bed or in a cupboard

beside the bed—not like a bogy man, in front of his eyes. Avoid forcing the child to assist at the shame of his bed-making. Dr. Odlum says that wearing wet clothes does not deter the enuretic. Why, then, should handling wet bed-clothes do so? It is cruel and irrational, and makes him metaphorically dig the nightly grave of his happiness. Children look for reason and consistency also in their elders, to whom they look for help. The child whose enuresis has a psychological basis often (in my experience, always) has at one time learnt to be dry, but following an illness or other event reverts to babyish wet habits. A few minutes alone with him will often bring out a story of parental neglect or excessive indulgence, jealousy of brothers or sisters, or some other real or fanciful grievance. The relation of these things to his complaint should be explained to him privately and a more grown-up method of solving his problems encouraged.

I must protest vigorously against Dr. Odlum's sweeping assertion that enuresis in the daytime after the age of 5 must definitely be regarded as deliberate naughtiness and punished accordingly. This may be her experience, but it certainly is not mine, and I am sure that the cases I see in the psychological department of a provincial general hospital are not unique. The acceptance of this dogma would result in cruel oppression in certain cases. Imagine the shy, timid child who wets her knickers in company through a combination of nervousness and a lack of understanding of her complaint by her elders, even her doctor, seeing all her privileges, as Dr. Odlum suggests, slipping away through mistakes which are thereby rendered more frequent by apprehension. What a hell her life would be if in addition she had a wet bed to make every morning, have nothing to drink in the evening, and face the nightly prospect of being roughly dragged from her slumbers to use the chamber which stands at her bedside, a silent witness of her wretchedness.

In brief, I think the solution of the problem is this. Such children should be treated by those who understand and in their private lives are fond of (not merely interested in) children. The aim should be to get rid of the complaint at one sitting by suggestion and, in appropriate cases, explanation of the adult method of facing problems, using simple language—baby talk if necessary. Above all, avoid introducing regimes which serve to convince the child that his bladder won't hold water.—I am, etc.,

Leek, Jan. 11. J. MALLOY, M.D., D.P.M.

SIR,—I feel a voice should be raised to spare some unfortunate children from the undeserved punishment to which Dr. Doris Odlum condemns them in her article in the *British Medical Journal* of January 6. Referring to enuresis in the daytime, after the age of 5 years, she says it must definitely be regarded as deliberate naughtiness and punished, preferably on the spot. If it is "to be laid down as an axiom," as Dr. Odlum says, that "scolding and punishment should never be employed" in dealing with nocturnal incontinence, why must the same unfortunate child be the victim of summary wrath if its bladder control proves inadequate during the hours of daylight?

In outlining the treatment of nocturnal enuresis Dr. Odlum advises restriction of fluids before bed-time, and especially tea. This is sound advice, embodying, no doubt, the experience of many mothers. Yet in discussing the physical causes of enuresis Dr. Odlum gives first place to extreme acidity or alkalinity accompanying a concentrated urine, and says that the attempt to cure bed-wetting by restricting fluids "usually makes matters worse." These inconsistencies arise from a failure to appreciate the existence of what is perhaps the most important physical cause of enuresis—namely, polyuria. The bed-wetting child is not all bladder and brain, and the emotional instability which sets the bladder–spinal-cord reflex arc at a "hair-trigger" adjustment does the same with the vasomotor system that is behind the secretion of urine, with the result that there is an exaggerated response to diuretics. After drinking an equal amount of tea with other children the enuretic child will have more urine in its bladder to hold than the others, and if any circumstances lead to chilling of the body surface at the same time this will further exaggerate the diuresis.

It is surely not difficult to imagine circumstances beyond the control of a timid and highly strung child even during the hours of daylight, such as in school or on a walk, when with a bursting bladder it will go through tortures of body and mind in an attempt, which finally proves vain, to hold out until an opportunity for relief comes rather than expose its predicament to the jeers of ribald schoolfellows or the disgust and anger of unsympathetic adults. Such an "accident" even less demands punishment than the nocturnal ones, and the generalization that all day-time enuresis is deliberate naughtiness is far too sweeping.—I am, etc.,

Clifton, Jan. 8. ALAN G. BODMAN.

Gas Helmet as Oxygen Tent

SIR,—Dr. W. Hartston's article in your issue of December 30, 1939 (p. 1279), in which he describes a simple method of converting a Government baby gas helmet into an oxygen tent, must have been noted with great interest by many of your readers.

Shortly after the appearance of this article, a baby aged 3 months suffering from bronchopneumonia was admitted to this hospital under my care. The severity of the illness may be judged from the fact that its respiration rate was 110. It was cyanosed, undernourished, and crying feebly. Following Dr. Hartston's clear instructions, a baby gas helmet was rapidly converted into an oxygen tent and the respiration rate fell to 80, at which level it was maintained for some five or six days. Now the respiration rate is 50 and the baby is well on the road to recovery. There is no doubt that but for the continuous oxygen the outcome would have been fatal.

Although this home-made oxygen tent may not be as scientifically accurate as the commercial variety, yet in practice it only presents one disadvantage—namely, that owing to its small cubic capacity the temperature inside it tends to become unduly high. This can be offset to a certain extent by having a bucket full of ice by the side of the cot, coiling inside this the tube carrying the oxygen, so that a stream of cold oxygen enters the tent. If dehydration is then prevented by giving half-strength normal saline hourly by mouth in between the milk feeds no harm results.

My object in writing this letter is to emphasize the importance of Dr. Hartston's extremely neat and simple invention.—I am, etc.,

A. MORTON GILL,
Medical Officer in Charge.

Slough Emergency Hospital, E.M.S., Jan. 15.

Treatment of Varicose Ulcers

SIR,—The recent correspondence on the treatment of varicose ulcers has prompted me to write a short note on the subject. I quite agree that in a large number of cases elastoplast dressings are of no value. In fact my experience goes to show that this particular type of dressing often aggravates the underlying condition and produces a generalized dermatitis. I have been greatly interested in the various modes of treatment which have been discussed, and venture to give an opinion based on the method I have used in a number of cases which have come under my care.

The stimulating properties of cod-liver oil as a healing medium are universally recognized, and I have used this substance in conjunction with allantoin. Allantoin is a urea derivative. As is well known, urea itself has the property of stimulating the growth of granulation tissue and promotes proteolysis of necrotic tissue. The mixture I employ for my purpose is an ointment consisting of cod-liver oil and 1/2 per cent. allantoin, which is made up for me in tubes by Messrs. Allen and Hanburys. The ulcer is cleansed thoroughly every other day with a weak solution of dettol. The cavity is packed with the ointment and then covered over with two or three layers of gauze dressing and cotton-wool, which are held in place by a firm crêpe bandage. Any discharge permeating the bandage is gently removed, but the dressing itself is not disturbed. I find that this ointment not only acts as an excellent emollient but gives the patient tremendous relief from

pain. In one case which I recently treated the patient had been suffering from a chronic varicose ulcer for three years which was resistant to any treatment. As the result of applying the cod-liver oil and allantoin mixture the ulcer completely healed up in the short space of two months. Another case is that of a lady of 70 who had suffered from a varicose ulcer for twenty-five years. All treatments had proved unavailing. When I first saw her the wound measured about six inches in length, about three inches across, and was correspondingly deep. She was permanently incapacitated. After eighteen months' treatment the wound is now nearly healed. She is free from pain and able to walk about reasonably well.—I am, etc.,

Kingston-on-Thames, Dec. 31, 1939. M. H. FRIDJOHN.

Post-operative Pneumonia

SIR,—Dr. W. Lees Templeton (*Journal*, January 6, p. 36) appears to have read my letter hurriedly or carelessly. I am quite familiar with the condition of post-operative pulmonary collapse. The cases I treated occurred several days after operation, during an epidemic of coughs and colds, and were diagnosed by a physician.

X-ray diagnosis for pneumonia in private practice presents difficulties, mainly financial, though in one case the diagnosis was confirmed by *x* rays. The only reference to "twenty-four hours" was a mild and good-natured jest at our colleagues of the nursing profession, who often say a patient is "quite comfortable" twenty-four hours after a laparotomy! I said that the painlessness of the injections given by my method was not vouched for by such nursing reports but by the patients themselves. This is the only reference, as I have said above, to "twenty-four hours," and obviously does not allude to the onset of the pneumonia.—I am, etc.,

Hove, Jan. 8. H. J. MCCURRICH, M.S., F.R.C.S.

Pressure on Ulnar Nerve

SIR,—I would like to report one of those infrequent cases of pressure-paralysis which one is taught about and reads about but seldom sees.

A few weeks ago a girl aged about 16 years and employed in a factory came to me complaining of inability to use the right little finger. On further questioning as to the exact nature of her occupation I learnt that she was engaged in using a screwdriver, which she held in the palm of her right hand. With the hand at rest the affected finger was abducted with an extension movement of the wrist, the blade of the instrument obviously pressing against the ulnar margin of the hand. With the hand at rest, the affected finger was abducted from the ring finger; there was wasting of the muscles constituting the hypothenar group, but sensation was unaffected. The patient was unable to approximate the little finger to the next or to flex it or to touch the tip of the thumb with the affected finger. I advised a change of occupation and massage and bandaged the finger to the next. A week later, when I saw the patient again, there was considerable improvement.

Such cases are likely to be seen more frequently under prevailing conditions, hence I report this case.—I am, etc.,

Hayes, Jan. 12. E. S. FENNELL, M.B., B.S., M.R.C.P.

Sedatives for Nervous Casualties

SIR,—On reading Dr. Stungo's letter published in the *Journal* of December 30, 1939 (p. 1296) under the above heading, I am glad to see that he disagrees with the use of morphine for such cases, as advocated in the Memorandum of the Emergency Medical Service to which he refers. This agrees so closely with the opinion expressed in my letter published in the *Journal* of September 30, 1939 (p. 700) under the heading of "Psychological Casualties in War" that I hope you will allow me space to support Dr. Stungo's views.

The barbiturates are now available in a host of varieties to suit the needs of any particular case, but in spite of this morphine still seems to be the commonest drug prescribed by the general practitioner to produce sleep. I therefore take this opportunity of again expressing my opinion, based on over thirty years' experience, "that morphine in any form should not be given unless there is reason to believe that pain is the cause of sleeplessness." Apart from other complications to which morphine may give rise, this drug is prone to cause mental manifestations in those who have psychoneurotic tendencies or who may have idiosyncrasies to its action, and thereby does more harm than good.

But to come to another important issue raised by Dr. Stungo, it is of little use giving any "sedative" if the patient is not to be cared for in suitable surroundings. The present ostrich-like methods of non-recognition of "shell shock," fear, neuroses, war neuroses (call them what you may), the policy of sending civilians home from first-aid posts and returning Service cases to their units, are surely based upon the experience of those who were working under totally different conditions from those to which we are likely to be subjected. As pointed out in my previous letter in your issue of September 30, the cases treated at Seale Hayne Hospital during the last war, referred to by Sir Arthur Hurst in his letter in the *Journal* of September 23, 1939 (p. 663), and again in his letter in the *Journal* of January 6 (p. 31), were "specially selected" and treated under special conditions so that the basic psychological mechanisms (the conflict between the instinct of self-preservation and the self-regarding sentiment) were solved. More of these special hospitals will be required in the present war, not only for cases subjected to the stress of active service but also for many "misfits" in regimental depots who will develop exactly the same symptoms as a result of the conscription of the male adolescent population. But until these special hospitals are provided they must be sent to public assistance institutions (irrespective of status), from which no doubt many will be transferred to mental hospitals. Very few of the former institutions have proper facilities for dealing with such cases and most of the latter are overcrowded. This therefore seems a matter which needs urgent attention.—I am, etc.,

Countess Wear, near Exeter, Jan. 10. RICHARD EAGER.

Relapses after Sulphonamide Treatment of Gonorrhoea

SIR,—I am interested in the comparatively high rate of relapse after sulphonamide therapy (20 per cent.) reported by Mr. A. J. Cokkinis and Dr. G. L. M. McElligott (*Journal*, December 2, 1939, p. 1080). In a group of privately treated cases (about 200 and mostly males) this relapsing tendency has not been observed. My tests of cure are the following: (1) Fourteen days after cessation of all treatment, provocation by gonococcal vaccine 200 millions and alcohol, examination of morning discharge, urine, discharge at time of visit, and prostatic and Cowper gland secretions after urethral irrigation. (2) Seven days later after provocation by compligon (0.5 c.cm.) and alcohol, examination as before, including secretion from the seminal vesicles. (3) Seven days later urethroscopic examination of anterior urethra, passage of acorn bougies to bulb, full dilation of anterior and posterior urethra with metal bougies. (4) One month later after provocation by aolan intradermally and stout, examination as before, save that on this occasion the urethra is used as a culture medium, no irrigations are given, and no urine passed for three hours after the prostato-vesicular massage. (5) Examination of patient three days and four months later. With co-operative patients completing these tests during the last six years (sulphonamide-treated since June, 1937), and at the Salford Municipal Clinic during the preceding four years, with similar tests, no relapses were seen among patients completing the tests in whom a recent exposure to infection was not obtained. In other words, all apparent relapses could be explained by reinfection. The number of cases amounts to over 3,000.

The small number of personally observed sulphonamide-treated cases (200) is insignificant when compared with Cokkinis and McElligott's 1,500. These cases, however, were observed daily with the exception of some Sundays. It was frequently noted that the second glass of the two-glass test

became cloudy for two to three days only. The patients, however, showed a definite prostatitis. Patients showing no haziness in the second glass, observed from the early days of infection, in whom there had been no previous infection gave no evidence of prostatic or vesicular involvement. Cokkinis and McElligott observe that prostatic beads in their relapse cases, previously negative, may show pus, and note that many relapse cases have prostatitis, cystitis, epididymitis, or arthritis. The suggestion is here made that in clinic cases posterior infection may be easily missed when the case is seen only once or twice a week. Similarly, older patients may not reveal their prostatic or vesicular infection until several massages have been performed after repeated dilatation of the urethra with full-sized bougies. It is more difficult to eliminate previous infection and to differentiate between recent exposure and relapse in clinic than in privately treated cases.

I have been amazed at the length of time infection can remain confined to the anterior urethra—in one instance for six months. This was a case with numerous para-urethral ducts and fistulae treated in pre-sulphonamide days with local treatment to the anterior urethra only. Similarly, patients with posterior urethritis, even of some weeks' duration, do not necessarily have the prostate or seminal vesicles infected, provided they are not subjected to excessive pressure during irrigations and are co-operative with regard to behaviour.

Cokkinis and McElligott obtain better results in patients treated at a later stage of the disease than in those treated earlier. It is suggested that more cases in the former group are recognized as cases of posterior urethritis, and receive more prostatic and vesicular massage than the second group. This may explain the higher incidence of relapse in the early sulphapyridine-treated cases. I do not agree that the para-aminobenzenesulphonamide-treated cases do better when treatment is delayed (*S. Afr. med. J.*, November 12, 1938). With ulcron I have not had sufficient experience.—I am, etc.,

Cape Town, Dec. 28, 1939. F. W. F. PURCELL.

Gonococcal Proctitis treated with Sulphapyridine

SIR,—I reported in your issue of April 8, 1939 (p. 749) a case of gonococcal proctitis in a male, uncomplicated by urethritis, treated by sulphapyridine (M & B 693) and gonococcal vaccine. Clinical cure was obtained in a week, and laboratory tests were negative five weeks later and after a further four weeks. He has since been under observation but had no further treatment. Symptoms have not returned. It is now a year since infection began, and tests for cure have been repeated. A provocative injection of vaccine (1,000 gonococci) and a gonococcal fixation test were negative. Proctoscopy showed a normal rectum with no evidence of stricture, and smears were negative for gonococci.

This case is of interest, since it seems to be the only one reported, but especially in respect to the problem of relapses after sulphonamide therapy for gonorrhoea, as raised by Mr. A. J. Cokkinis and Dr. G. L. M. McElligott in the *Journal* of December 2, 1939 (p. 1080).—I am, etc.,

London, W.C.1, Jan. 8. EDWARD T. RENBOM, M.D.

Turnip Juice for Peptic Ulcer

SIR,—In the paragraph on ascorbic acid and peptic ulcer (*Journal*, January 6, p. 25) you mention (*a*) that the usual Sippy diet contains much less than the normal requirement of ascorbic acid (which I suppose to be synonymous with vitamin C or at any rate very close to it), and (*b*) that the juice of one or two fresh oranges will supply the deficiency. (Warren, Pijoan, and Emery. *New Engl. J. Med.*, June 29, 1939, 220, 1061.)

For some years we have been using turnip juice or turnip and orange juice mixed for that purpose, because reason (*a*) was obvious. We did not know the fact further suggested by your note that patients with duodenal ulcer utilize 20 per cent. more ascorbic acid than do normal people. If so, it is of great interest and throws a light on the rapid improvement we thought we noted in our patients. The turnip juice is made by cutting off the top of a turnip (the white globe are preferred for taste; but swedes will do, or yellow turnips), hollowing out the turnip, filling the hollow with brown sugar (Barbados muscovado for choice), and standing the thing upright. Next day the sugar has dissolved in the juice it has sucked from the flesh. The turnip will be fresher than oranges, which (*vide* Professor Plimmer) deteriorate in vitamin content when in cold store. Anyhow the mixture is found to be very acceptable and effective (cf. Miss Harriet Chick's experiences with turnip juice in the Infants' Hospital in Vienna in 1919).—I am, etc.,

Holmes Chapel, Jan. 7. LIONEL JAS. PICTON.

Obituary

ALEXANDER DINGWALL-FORDYCE, M.D. F.R.C.P.Ed.

Alexander Dingwall-Fordyce was born in 1875 in Edinburgh and came of an old and well-known Aberdeenshire family, the Dingwall-Fordyces of Bruckley Castle. He was a pupil of Edinburgh Academy and qualified M.B., Ch.B. at Edinburgh in 1898. Postgraduate studies followed in Vienna, Berlin, and Paris, and he was elected a Fellow of the Royal College of Physicians of Edinburgh in 1903; the degree of M.D.Ed. was awarded to him in 1904.

The earlier part of Fordyce's professional career, interrupted by service in the R.A.M.C. during the great war, was spent in his native city of Edinburgh, where he was elected assistant physician to the Children's Hospital in 1906, and was promoted to full physician, with charge of a ward, in 1917. During this period he played an influential part in the medical life of Edinburgh; he worked with others to promote the development of child welfare services in the city, and he held the office of secretary to the Royal College of Physicians from 1914 to 1918. Migration from his native country—one of the most constant characteristics of distinguished Scotsmen—came in 1920 when he transplanted himself to Liverpool and was appointed honorary physician to the Royal Liverpool Children's Hospital and lecturer in diseases of children in the University. These offices he held until 1935, and in both he gave faithful and zealous service.

His breadth of vision made him one of the pioneers in transforming "diseases of children" into "paediatrics"—not for the sake of a comparatively new and ugly word, but to encompass the wide range of his subject, the study of children both healthy and diseased. He was quick to seize upon the great importance of prophylaxis in childhood and he was an ardent supporter of all that was best in the child welfare movement and child guidance. To restrict his studies to the diseases of children would have been too narrow a service for one whose sympathetic nature demanded access to a much larger clientele; he never ceased to teach the importance of preserving health, both physical and mental, in children, and he lived up to this doctrine in his practice.

It is not unusual for a man to reveal personal qualities which are expressive of the work to which his life has been devoted. Certainly it may be said of Fordyce that his strongest assets were qualities which are found frequently in children: charm of manner, trust in his fellows, and openness of outlook combined to make him a respected and much-loved doctor and colleague. Other qualities, no less characteristic of children, were there, and some of them may have acted as a brake upon his

power of achievement; for instance, he was always a shy and unobtrusive man, cautious lest he might give offence; and the vigour of his mind was not always apparent to those who did not know him well and could judge only by obvious results.

He was well known as an author and was a member of the Editorial Committee of the *Archives of Disease in Childhood*. In 1908 he was secretary of the Section of Medicine at the Annual Meeting of the British Medical Association, and he was vice-president of the Section of Diseases of Children at the Edinburgh Meeting in 1927. Numerous medical societies enjoyed his membership, notably the British Paediatric Association and the Association of Physicians of Great Britain and Ireland. No honour gave him greater pleasure than his election to the office of President of the British Paediatric Association in 1933, for he saw in this association a means by which the precepts so dear to himself could be handed on from generation to generation of workers in paediatrics.

It was natural that the services of so distinguished a children's physician should be eagerly sought by many institutions; he was consulting physician to the Royal Liverpool Children's Hospital, honorary director of the Liverpool and District Child Guidance Clinic, honorary physician to the Birkenhead and Wirral Children's Hospital, and honorary consulting physician to the Open-Air Hospital for Children at Leasowe, the Carnegie Child Welfare Institute, and the West Kirby Children's Convalescent Home.

Dr. Dingwall-Fordyce died in Liverpool on January 7, and much sympathy goes out to his widow and two children.

WILHELM NEUMANN, M.D.

By the death of Dr. Wilhelm Neumann a great medical career is over in circumstances which are at once pathetic and noble. Dr. Neumann had lived in Leamington for only six months, and during that short time had greatly impressed all who met him as a man of ability, character, and charm. His life had been one of alternate success and reverse, and it seemed that at long last Leamington could offer a permanent refuge for him to devote himself to the work he loved—that of a spa physician.

Graduating at Freiburg, under Professor Albert Fraenkel, he was advised to start in practice in Nervi—Italy at that time being an ally of Germany—and he settled there in 1912. Success came quickly, only to be checked by the entrance of Italy into the great war on the side of the Allies. Neumann left his practice and all its growing prosperity to return to serve his country in the Army. His knowledge and skill in military hospitals were recognized and eagerly sought, and during this time he devoted himself very largely to *x*-ray work, thereby causing considerable damage to his own rather frail constitution. This work he did till the end of the war, when he started private work in Baden-Baden. Once again his experience, knowledge, and recognized ability soon made him the most prominent physician in that town, and for fifteen years his consulting-room was thronged by invalids of many nationalities, especially from this country. His thoroughness in the investigation of his patients enabled him to prescribe with confidence, and his popularity testified to his medical wisdom. By the approach of National Socialism, with its anti-Semitic propaganda, his Jewish parentage made his residence in Germany insecure, and, in spite of all he had done for his Fatherland, he was compelled in 1937 to leave his home and friends and once more migrate southwards to San Remo. Here he was already well known. Good fortune overtook him once more, and his opinion and help were much in demand by the cosmopolitan population of the Riviera; but again a stern edict against his race expelled him from Italy in the beginning of last year. He was then invited to this country and welcomed by the medical profession. His enthusiasm and charm of personality have already made a deep and lasting impression on the small circle of friends he acquired. He had many plans for helping Leamington in its national usefulness as a spa, and these were not extravagant or impracticable in character. His one aim was to do good to the town of his adoption.

He was married in 1926, and leaves a young wife and an adopted daughter, with whom all his friends will feel the warmest sympathy. A man of culture, he was devoted to literature, the arts, and music, and was himself a pianist of no small merit. The medical world has lost a great student and physician, and Leamington an enthusiastic citizen.

F. C.

Dr. FREDERIC JEFFERSON of Fortwilliam Park, Belfast, who died some weeks ago at the age of 52 after a very short illness, was well known throughout Northern Ireland. He was much interested in the welfare of ex-Service men, having himself served during the war of 1914–18, retiring with the rank of major. On his return to Belfast he established an extensive practice in ophthalmology, and was for a time honorary surgeon to the Belfast Hospital for Sick Children, and honorary assistant surgeon to the Royal Victoria Hospital and the Belfast Ophthalmic Hospital. He had many social interests, and was a prominent member of the Masonic Order. He became a member of the British Medical Association in 1922. The many friends of Fred Jefferson will miss his cheerful companionship, and the deep sympathy of a wide circle of friends is extended to his brothers.

One of the oldest members of the medical profession in Northern Ireland, WILLIAM MCGOWAN, M.D., died on December 17, 1939, in his ninety-eighth year. He was one of the first pupils of the famous Coleraine Academical Institution, and studied medicine at the Queen's College, Belfast. Dr. McGowan was dispensary doctor in Maghera, Co. Derry, for fifty-four years, and the appreciation of the inhabitants of the district was shown by a presentation on his retirement. He was looked upon as a friend by succeeding generations of patients in the district where he spent so much of his life, and he was respected by all his professional colleagues.

The death occurred on December 18 last, at his residence in Antrim Road, Belfast, of Dr. HIRAM J. MONYPENY, who was one of the best-known practitioners in the city. A student of the Queen's College, Belfast, Monypeny graduated M.B., B.Ch. in the Royal University of Ireland in 1897, and obtained the M.D. degree in 1902. He was a member of a well-known Belfast family, and held many important positions in the city, in both his professional and his private capacities. He was at one time doctor to the Post Office in Belfast, and later fulfilled the same duty to the Fire Brigade. His high qualities were universally respected, and he was a personal friend to all his patients. Dr. Monypeny's wife predeceased him by only four weeks, and the sympathy of a large circle of professional colleagues and friends will be extended to his family in their bereavement.

We regret to announce the death of Dr. JAMES ALEXANDER STEPHEN on January 1 at Aberdeen. Born at Elgin on June 29, 1873, son of Robert Stephen, M.A., he was educated at Milne's Institution, Morayshire, and Aberdeen University, where he graduated M.A. in 1895, and M.B., Ch.B. in 1899. After a year as junior demonstrator of anatomy at the university he was appointed M.O.H. for Lossiemouth and held that post for eighteen years except during the war period 1914–18, when he served with the rank of Captain R.A.M.C. (T.F.) in France. Dr. Stephen was for some years visiting physician and surgeon to Gray's Hospital and police surgeon at Elgin, and after the armistice became assistant M.O.H. for maternity and child welfare at Aberdeen, and lecturer on that subject in the university. He joined the British Medical Association in 1900, represented the Aberdeen Division in 1924 and 1927 at the Annual Representative Meetings, and was chairman of the Division in 1933–4; he was joint honorary secretary of the Aberdeen Branch from 1927 to 1933 and president in 1935–6.

Dr. GEORGE PERNET, who died in retirement on January 6 at the age of 78, was formerly well known in dermatological circles. Born in London and educated at the Universities of Bonn, Edinburgh, and Paris, he qualified M.R.C.S., L.R.C.P. in 1891, and graduated M.D. of Paris in 1908. He was for many years pathologist to the Hospital for Diseases of the Skin, Blackfriars, dermatologist to the West London Hospital, and lecturer in dermatology to the West London Postgraduate Medical College. He was elected a corresponding member of the Dermatological Societies of Paris, Madrid, and Copenhagen, and published many papers in these columns and elsewhere on diseases of the skin. When the British Medical Association met at Sheffield in 1908 he was honorary secretary of the Section of Dermatology, and two years later held office as vice-president of the same Section at the Annual Meeting in London.

Sir SAMUEL BRIGHOUSE, the oldest coroner in the country, died at Ormskirk on January 15 aged 90. He had been coroner for South-West Lancashire since 1884, and during that long period conducted some 25,000 inquests. He was born in August, 1849, at Lathom, a village three miles from Ormskirk, and at the age of 17 was articled to a firm of solicitors in Liverpool; after a year in London he was admitted a solicitor in 1871, and spent the rest of his life at Ormskirk. He was created a knight in 1934, and in the following year celebrated his golden wedding.

News has been received from Philadelphia of the death at the age of 58 of Dr. HENRY LOCKE PADDON, senior medical missionary associated with the Grenfell Foundation in Labrador for the past twenty-seven years. Harry Paddon went from Repton to Oxford as a medical student, and completed his studies at St. Thomas's Hospital, qualifying M.R.C.S., L.R.C.P. in 1911, in which year he joined the British Medical Association. After holding house appointments at the Guest Hospital, Dudley, he joined Sir Wilfred Grenfell in 1912, founded the North-West River Mission, and became head of the hospital school and of the industrial work of the Grenfell Foundation at Indian Harbour. In the course of his work on the Labrador coast Dr. Paddon covered thousands of miles by dog team, and gave medical help to Eskimos and Indians in the most isolated spots. He died on Christmas Eve while on furlough in the United States.

Medical Notes in Parliament

Parliament reassembled after the Christmas holiday on January 16.

Domiciliary Medical Service for Injured Civilians

On January 16 Mr. GROVES asked the Minister of Health whether, having regard to the dissatisfaction known to exist among general medical practitioners with regard to the distribution of work, some more satisfactory and impartial method than the procedure adopted for medical treatment of unaccompanied children in reception areas would be decided on, to obtain the cordial co-operation of general practitioners under the proposed domiciliary medical service for civilians who sustained war injuries in this country. Dr. ELLIOT said that, as would be seen from a memorandum shortly to be issued, the arrangements for the domiciliary treatment of uninsured civilians who sustained war injuries necessarily differed in certain respects from those made for unaccompanied children. He was not, however, aware of any dissatisfaction with regard to the distribution of work in relation to the medical treatment of these children in the reception areas; on the contrary, he had received the most cordial co-operation of the medical profession.

Silicosis Investigation by M.R.C.—On January 16 Captain WATERHOUSE told Mr. J. Griffiths that the investigation by the Medical Research Council into industrial pulmonary disease among workers in the South Wales coalfield had suffered some slight delay as a result of the war, but it was nevertheless hoped that sufficient evidence would be available for an interim report in the early summer.

Universities and Colleges

ROYAL COLLEGE OF SURGEONS OF ENGLAND

A meeting of the Council was held on January 11, with the President, Mr. Hugh Lett, in the chair.

Sir Humphry Rolleston, chairman of the Executive Committee of the Imperial Cancer Research Fund since 1924, and Sir Thomas Dunhill, Serjeant-Surgeon to the King, were admitted to the Honorary Fellowship. It was reported that Sir Hugh Devine, President of the Royal Australasian College of Surgeons, had accepted the Honorary Fellowship, subject to the condition of personal attendance at the College at some future date.

The Hallett Prize, granted on the result of the Primary Fellowship Examination, was awarded to James Grayton Brown of Melbourne.

The Council decided to institute a new series of lectures in physiology and a new series of demonstrations in pathology. Mr. D. H. Patey was elected Erasmus Wilson Demonstrator and Mr. Gwynne Williams has agreed to give six demonstrations in pathology before May next.

The Council accepted with very grateful thanks an offer from the American College of Surgeons to present a lecturer's table for the lecture theatre.

Mr. Arthur H. Burgess was appointed Hunterian Orator for 1941.

Sir Alfred Webb-Johnson was appointed Bradshaw Lecturer and Dr. Arnold Chaplin Thomas Vicary Lecturer for 1940.

The following hospital was recognized for the six months' surgical practice required of candidates for the Final Examination for the Fellowship: Clayton Hospital and Wakefield General Dispensary, Wakefield (resident surgical officer and house-surgeon).

Diplomas

Diplomas in Psychological Medicine and in Laryngology and Otology were granted, jointly with the Royal College of Physicians of London, to the following candidates:

DIPLOMA IN PSYCHOLOGICAL MEDICINE.—A. L. Abeyewardene, C. D. Amarasinha, G. F. Andrews, P. L. Backus, J. L. Barford, D. R. Davis, P. E. F. Frossard, D. W. T. Harris, A. J. Matheson, A. G. Moore, F. D. Paterson, T. P. Riordan, H. R. Rollin, Alice I. Roughton, A. M. Spencer, R. F. Tredgold.

DIPLOMA IN LARYNGOLOGY AND OTOLOGY.—J. H. Appleton, R. Chignell, C. S. David, A. H. Farid, A. T. George, W. C. Gledhill, M. O'Regan, D. Y. Richardson, A. Russell, H. C. Saksena, G. S. M. Wilson.

Museum Demonstrations

A course of museum demonstrations in the theatre of the College begins on January 23, when Mr. R. Davies-Colley will discuss tumours of the bones. He will speak on the same subject again on January 30, and on diseases of muscles on February 9. On January 25 and February 1 and 8 Mr. D. H. Patey will discuss specimens illustrating the pathological effects of trauma. All the demonstrations begin at 3 p.m., and are open to advanced students and medical practitioners.

Medical News

The annual general meeting of the Harveian Society of London and the Buckston Browne Luncheon will be held on Wednesday, January 31, at 12.45 p.m., at the Langham Hotel, Portland Place, W.

The British Institute of Philosophy announces that the sixth address of the special series of free public addresses entitled "The Deeper Causes of the War and the Issues Involved" will be given by Sir William Beveridge in the Assembly Hall (entrance in Craven Street, Strand, W.C.2) of the Royal Empire Society at 2 p.m. on Thursday, January 25. Subject: "Peace by Federation." Further addresses will be given by Sir Richard Gregory and Professor Ernest Barker on dates to be announced.

The Langley Memorial Prize, value £21, is open to competition among officers of the Colonial Medical Service who are serving, or who have served, in West Africa, and will be awarded for the best paper submitted on a topic falling within one of the following subjects (special consideration being given to original work): (*a*) tropical medicine or surgery; (*b*) tropical hygiene and sanitation; (*c*) tropical entomology and parasitology. Papers, which may consist of published or unpublished work, should be delivered to the secretary, London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1, by October 1.

The Buckston Browne Prize Essay for 1939 of the Harveian Society of London has been awarded to Captain Robert Kemp, R.A.M.C., Dr. James Aitken being *proxime accessit*. The subject of the prize was "The Value of Periodic Medical Examination in Middle Life."

A meeting of the London Jewish Hospital Medical Society will be held at the Jewish Communal Centre, Woburn House, Upper Woburn Place, W.C., on Wednesday, January 24, at 2.15 p.m., when there will be a symposium on "The Future of Organized Medicine." The speakers will be Dr. Andrew Topping, Mr. Somerville Hastings, Dr. C. L. Batteson, and Mr. J. C. Gilbert.

A conference on problems of social environment and the war, arranged by the Housing Centre, will be held at the Royal Institute of British Architects, 66, Portland Place, W., on Friday, February 2. The morning session (10.30 a.m. to 12.45 p.m.) will be presided over by Sir Wyndham Deedes; the afternoon session (2 to 4 p.m.) by Lord Horder. The address of the Housing Centre is 13, Suffolk Street, S.W.1.

The offices of the Public Health Department of the Borough of Hampstead have been removed from the Town Hall to 33–5, Lancaster Grove, N.W.3. The nearest stations are Belsize Park and Swiss Cottage. The telephone number remains unchanged (Primrose 4421).

As a result of a deputation which waited on the Minister of Health on October 27, Dr. Elliot invited the National Association for the Prevention of Tuberculosis, the Joint Tuberculosis Council, and the Tuberculosis Association to set up a committee to keep in contact with the Ministry, the tuberculosis service, and the general public. Delegates from the Society of Medical Officers of Health have also been appointed, together with the Medical Officer of Health to the London County Council and a representative of the Ministry of Health. This committee has now been formed under the title of Standing Advisory Committee on Tuberculosis, and has already met. Its personnel consists of Sir Percival Hartley, Dr. J. H. Harley Williams, Dr. S. Vere Pearson, Dr. J. B. McDougall, Dr. G. T. Hebert, Dr. N. Lloyd Rusby, Dr. James Ferguson, Dr. Ernest Ward, Dr. W. Allen Daley, and Dr. Norman Smith.

The authoritative book *Leprosy* by Sir Leonard Rogers and Dr. Ernest Muir, which first appeared in 1925, has been revised by the authors and a new edition will be published shortly by John Wright and Sons.

According to a recent enactment medical qualifications obtained in Italy will be valid in Rumania.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

In England and Wales the only common notifiable disease to show an increase during the week is pneumonia (primary and influenzal); the amount is negligible and is more than covered by the rise in the numbers for London. In the corresponding week of 1939 there were nearly twice as many cases and 50 per cent. more deaths. It is not justifiable to conclude that the current type of influenza is therefore more severe and fatal, as the proportion of cases due to primary pneumonia is not available in the Registrar-General's returns.

Dysentery is slightly more prevalent than in the previous week, but less prevalent than in recent weeks; London, which has been comparatively free from the disease, is responsible for the rise. The high figure for Scotland is due almost entirely to an outbreak in the County of Kincardine, where there were 24 out of the total of 43 for Scotland: Dundee had 5, Paisley 5, Glasgow 4, and Edinburgh 3 cases.

Diphtheria was more prevalent in Scotland than in the corresponding week last year and has shown a recent tendency to increase; the type of the disease does not appear to be severe as judged from the mortality. Cases continue to appear in South Shields despite an intensive immunization campaign for upwards of two years; 7 fresh cases were reported in the last three weeks of 1939 and 3 deaths in the first week of 1940.

Quarterly Return of Births, Deaths, and Marriages

Scotland.—In the quarter ended September 30, 1939, there were 21,546 live births registered in Scotland, 2,069 fewer than in the preceding quarter, corresponding to a rate of 17.1 per 1,000 population, 1.8 below that for the preceding quarter. This number of births is 46 in excess of the average for the last five years for this quarter, but the rate per 1,000 population is 0.1 less than the average. Of the total births 6 per cent. were illegitimate, the same as in the preceding quarter but 0.5 below the five-years average. Stillbirths numbered 981, the same as in the preceding quarter. Deaths at 13,587 represented a rate of 10.8 per 1,000 population; this number is 9 above the five-years average for this quarter, but the rate per 1,000 population is 0.1 less. In individual boroughs the death rate ranged from 14.1 in Inverness, 12.8 in Arbroath, and 12.3 in Ayr, to 8.5 in Kilmarnock, 8.4 in Airdrie, and 7.2 in Rutherglen. The infantile mortality rate was 57 per 1,000 registered live births, or 4 less than in the previous quarter and 2 less than the average in this quarter during the preceding five years. The rate was 64 in the large boroughs and 47 for the rest of Scotland; high rates were reported in Greenock 91, Paisley 90, Ayr 90, Inverness 78, and low rates in Arbroath 15, Rutherglen 12, and Dumfries 11. Only 212, or 1.6 per cent., of the total deaths registered were attributed to infectious diseases; of these 77 were due to diphtheria, 39 to whooping-cough, 24 to influenza, 9 to scarlet fever, 7 to cerebrospinal fever, and 5 to measles.

Eire.—In this quarter 14,204 live births were registered, equivalent to a rate of 19.4 per 1,000 population and 0.6 below that for 1938. Of the total births 3.2 per cent. were illegitimate. There were 8,600 deaths, equivalent to an annual rate of 11.7, the same as in the corresponding quarter of 1938. The infant mortality rate was 52 per 1,000 births registered, compared with 55 for 1938. Deaths from the principal epidemic diseases represented an annual rate of 0.4 per 1,000 population, the same as in 1938. While decreases were reported in respect of the majority of these diseases deaths from typhoid fever were 7 more, and from diarrhoea and enteritis in children under 2 years of age 15 more. Three deaths from typhus fever were recorded. Deaths from puerperal causes corresponded to a rate of 3.1 per 1,000 births registered (0.6 from puerperal sepsis and 2.5 from other puerperal conditions), compared with a rate of 3 in 1938 (0.6 from puerperal sepsis and 2.4 from other puerperal conditions).

Northern Ireland.—There were 6,340 births registered during the quarter, equivalent to an annual rate of 19.6 per 1,000 population, 0.7 below the corresponding quarter of 1938 and 0.8 below the average for the corresponding quarters of the immediately preceding ten years. Of the total, 296, or 4.7 per cent., of the births were illegitimate. Deaths numbered 3,686, representing an annual rate of 11.4 per 1,000 population, or 0.4 below that for 1938 and 0.1 below the average for the preceding ten years. The infant mortality rate was 55 per 1,000 live births, compared with 56 for the preceding quarter and 62 for the corresponding quarters of the five preceding years. During the quarter the notifications of the principal infectious diseases were: scarlet fever 838, diphtheria 270, pneumonia (primary and influenzal) 53, erysipelas 39, enteric fever 28. The annual death rate from the principal epidemic diseases was 0.51 per 1,000 population, compared with a rate of 0.48 in the corresponding quarter of 1938 and of 0.61 for the preceding five years.

No. 51 for 1939

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended December 23, 1939.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : (*a*) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1939					1938 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	26	—	6	—	—	14	4	8	1	—
Deaths		—	—				1	—		
Diphtheria	813	31	255	51	35	1,124	112	204	46	27
Deaths	17	1	9	3	1	31	3	9	2	1
Dysentery	38	12	43		—	27	12	14		—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	1	—	—		—	2	—	—		—
Deaths		—	—				2	2		
Enteric (typhoid and paratyphoid) fever	15	2	2	4	—	31	2	2	9	1
Deaths	1	1	—	—	—	1	—	—	—	—
Erysipelas			71	10	3			67	5	2
Deaths		—	—				1	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	28	1	3	8	2	47	15	9	2	—
Measles	1,772	11	14		89		21	11		—
Deaths	3	—	—	1	2	2	—	—	1	—
Ophthalmia neonatorum	59	4	16		1	72	4	18		—
Deaths										
Pneumonia, influenzal*	454	26	12	3	22	825	100	7	7	10
Deaths (from influenza)	27	4	9	1	1	41	1	7	4	3
Pneumonia, primary			165	5				261	9	
Deaths		5		22	8		12		16	10
Polio-encephalitis, acute	2	—				2	—			
Deaths		—					—			
Poliomyelitis, acute	4	—	—		—	29	4	1		2
Deaths		—	—				—	—		
Puerperal fever	4	4	8	3	—	1	1	10	1	—
Deaths		—					—			
Puerperal pyrexia	111	9	13		1	119	11	14		1
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,072	32	157	52	83	1,402	96	258	43	69
Deaths	2	1	—	—	—	3	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	734	14	20		1		148	335		27
Deaths	1	—	—	—	—	12	4	8	3	1
Deaths (0-1 year)	341	25	63	30	8	367	69	95	22	14
Infant mortality rate (per 1,000 live births)						61	57			
Deaths (excluding stillbirths)	5,280	802	681	196	153	5,357	1,000	727	208	172
Annual death rate (per 1,000 persons living)			13.8	13.2	13.4	13.2	12.7	14.8	14.1	15.2
Live births	4,919	611	829	232	188	4,828	799	814	205	193
Annual rate per 1,000 persons living			16.8	15.6	16.5	11.9	10.2	16.6	13.9	17.1
Stillbirths	260	36	45			289	39			
Rate per 1,000 total births (including stillborn)			51			56	47			

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Natural Antiseptics in the Mouth

MR. JAMES CAMPBELL, L.D.S. (Berkhamsted) writes: In the *Journal* of January 13 (p. 78) "J. H. G." asks what evidence there is for the presence of a "natural antiseptic" in the human mouth. Admittedly the evidence is circumstantial, but there are several factors which point to its existence, of which one is the fact that dental caries is more prevalent in some patients' mouths than others, despite identical diet and habits of oral hygiene, and in the face of no demonstrable differences in tooth structure. Dental caries is due to the penetration of oral bacteria into the tooth, but these bacteria can apparently live and flourish more easily in some people's mouths than others, so I think it is in order to assume that there is a "natural antiseptic" in some mouths. If we knew what this antiseptic is and could stimulate its production the problem of dental caries would be solved.

With reference to "J. H. G.'s" query in the *Journal* of January 13, we have received the following reply: The antiseptics in the mouth to which Professor A. Fleming referred at the meeting of the Section of Odontology of the Royal Society of Medicine (*Journal*, December 9, 1939, p. 1157) were lysozyme and leucocytes. The antiseptic power of leucocytes is well known, but reference might be made to Wright (*Lancet*, March 29, 1919) and Fleming (*Brit. J. exp. Path.*, 1926, **7**, 281). Lysozyme is an anti-bacterial ferment found in saliva and other secretions, and in tissues. It was described by Fleming (*Proc. roy. Soc.*, B, 1922, **93**, 306). Reference might also be made to Fleming's presidential address to the Pathological Section of the Royal Society of Medicine, published in the proceedings of the Society in 1932, and to Melnik (*Ann. Melch. Inst.*, Russia, 1936, **3**, 1).

LETTERS, NOTES, ETC.

Hot Immersion for Septic Extremities

DR. N. C. FISCHER (Boness) writes: I send you a note of a method I have used to deal with septic conditions of the hands, arms, feet, and legs for nine years with uniform success. The method is immersion in a bowl of water at from 110° to 112° F. for two hours three times daily. As the water cools a kettle is kept ready with boiling water to add a little occasionally to keep up the temperature. This, I maintain, relieves pain, shortens the duration of a worker's incapacity, and leads to a great diminution in tissue destruction. One or two practical details I may mention. Two large bowls may be used alternately; the part should be well immersed in the water. In a worker the hand of toil should have the thick horny layer of skin pared carefully away. This often discloses a small yellow point which should be punctured with the point of a scalpel. At this stage no pressure should be used to express pus, but the bathing now instituted. In the intervals of bathing the part should be covered with white lint or wool soaked in glycerin. A word as to the reasons for this procedure. A virulent organism is rapidly reduced to weakness by the continued subjection to the above temperature. The swelling is reduced by the hygroscopic action of the glycerin, so that stasis in the affected part is relieved, allowing a freer admission of blood to the part with its antibodies, which soon finish the activity of the organisms. If pus is detected a very small opening is made and the pus gently expressed. Care should be taken not to cut into healthy tissue if possible. The condition rapidly becomes that of a healing wound. Contraindications—in diabetics and in advanced degrees of arterial thickening in old workers. My experience with this method in an industrial district has been one of invariable success.

Acute Pulmonary Oedema

DR. TREVOR HUGHES (Ruthin) writes: On two recent occasions I have been called upon to attend patients with acute pulmonary oedema, and have been surprised by the response to salyrgan. Both these cases made a complete recovery within a few hours. A male aged 67, suffering from aortic aneurysm, was seen at 11 p.m. on November 6, semiconscious and showing definite signs and symptoms of acute pulmonary oedema. Intramuscular injection of salyrgan and hypodermic injection of atropine gr. 1/100, digitalin gr. 1/100, and strychnine gr. 1/60 were given. At 8.45 a.m. the next day the patient was very comfortable, with no lividity or respiratory embarrassment. He has remained well, with the exception of his old complaint. The second case was that of a woman, aged 78, who three days before had pulmonary oedema bronchitis, with a patch of pleurisy and underlying consolidation at the right base. I was summoned urgently at 4.0 p.m. on December 25, 1939, as the patient had become completely unconscious. Auricular fibrillation was present, and all the signs and symptoms of acute pulmonary oedema. Intramuscular injection of salyrgan and hypodermic injection of digitalin gr. 1/100 and strychnine gr. 1/60 were given. Atropine was omitted in this case owing to the auricular fibrillation. During the next two and a half hours I was expecting a message to say that she had died. I called at 6.30 p.m., and was surprised to find that the attack had completely passed off; the patient was fully conscious, her colour was good, and she was disposed to discuss commonplace affairs. She is now up again; her chest is clear, her pulse is regular, there is a trace of albumin in the urine, but there is no other evidence of cardiac failure. I would suggest that this method of treatment be borne in mind, should the occasion arise, in the treatment of patients suffering from the effects of lung-irritant gases.

Accidents and Industrial Waste

Lord MCGOWAN, president of the National "Safety First" Association (52, Grosvenor Gardens, S.W.1), has sent a letter to the Press advocating the greatest possible conservation of resources. In war time, when the urgency of production is the primary goal, there is a tendency to overlook many forms of industrial waste, and above all that most alarming form of industrial waste—accidents. The disorganization which results from an accident in the works retards production and renders impotent, even if only temporarily, valuable man power. The Chief Inspector of Factories has pointed out that every person injured in industry is a loss to the nation's resources, and also that the circumstances which make accidents more likely have been intensified by war conditions. Such factors as the dilution of labour, the advent into industry of workers unused to factory conditions, the increased rate of production, and the inevitable amount of monotonous work, all add to the difficulties. Firms which have undertaken, in conjunction with the National "Safety First" Association, an effective safety campaign have testified that this results in lower costs as well as more efficient working

Disclaimer

MR. R. GUY PULVERTAFT wishes to disclaim all responsibility for unsought publicity in the daily press in connexion with a patient of his treated at the Grimsby and District Hospital. He has remonstrated with the editors of the newspapers concerned, expressing annoyance at the mention of his name.